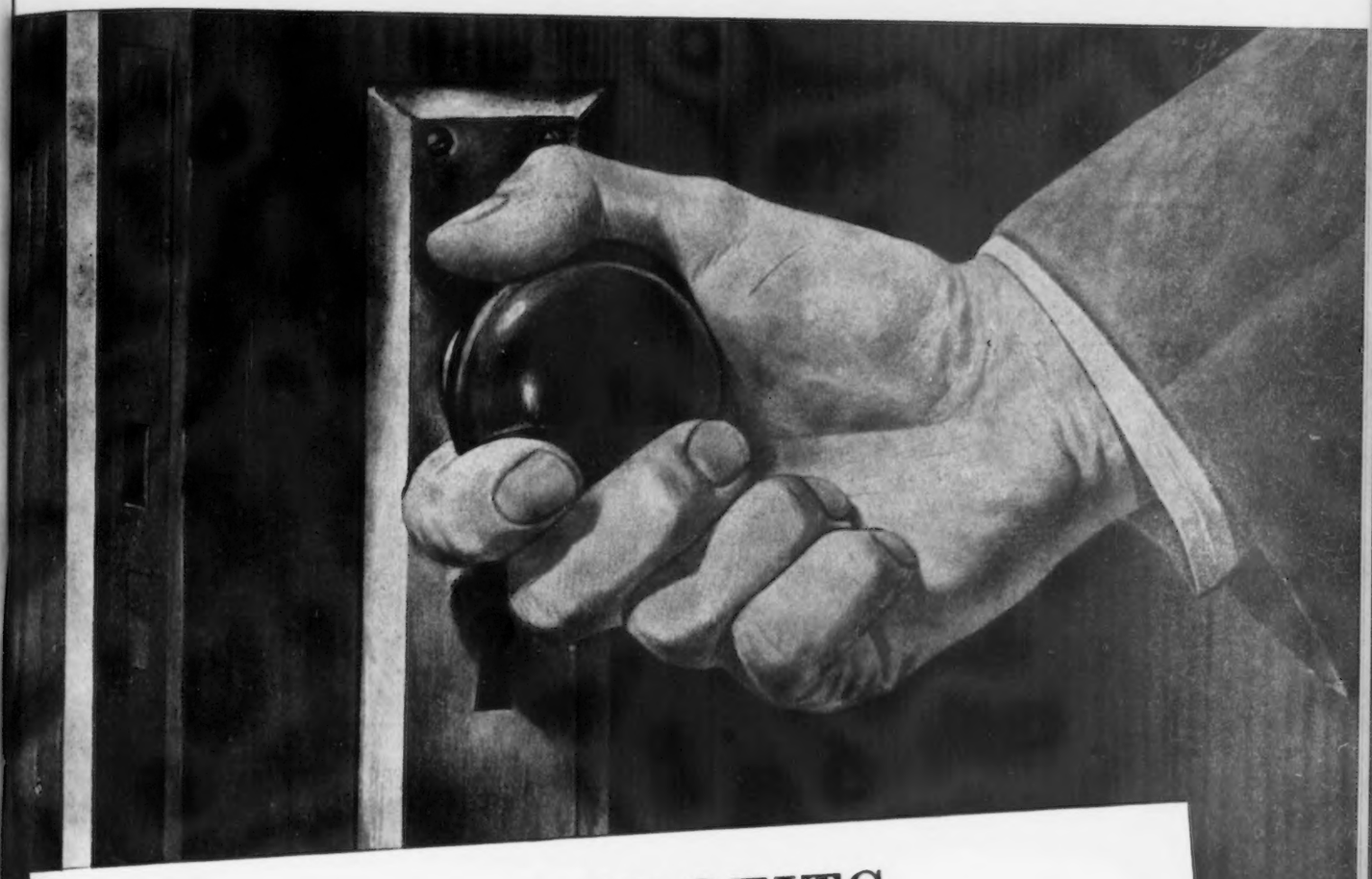
JUNE 27, 1946

THE IRON AGE

Editorial Index, Page 39



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THIS WEEK IN THE IRON AGE

Vol. 157, No. 26 June 27, 1946

Editorial

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Technical Articles

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Features

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News and Markets

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IMPORTANT NEWS

for users of alloy steel!

Pre-war alloys are not only coming back into Ryerson stocks, but many of them are already available. This will be important news to former regular users of these steels. Soon you will be able to get quick delivery on all the more popular pre-war alloys from your nearby Ryerson plant.

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THE
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June 27, 1946

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The Pit

YOU old timers and some of you younger ones, who appreciate good literature and prefer Edgar Allen Poe to Leslie Charteris and the other Johnny Come Lately managers of thriller production lines, will remember "The Pit and the Pendulum."

You will remember the nightmarish struggles of the victim to prevent his being pushed into this steep-sided excavation and to an agonizing death by the heat and pressure of the advancing walls of his dungeon.

I think it can safely be said that the weirdest imagination of fiction writers cannot equal the reality of ensuing facts. Take Jules Verne, for example. His imagination foresaw both under water and aerial transportation long before Simon Lake and the Wright brothers were born.

Bellamy's "Looking Backward," which was fiction, forecast many actualities that came a century later. And H. G. Wells in his "War of the Worlds" might be said to have forecast the form of destruction that may descend upon the earth in the form of rocket bombs.

Of the four, I will take Poe and his "Pit" as coming closest to what is happening today.

The pit that I have in mind is that of statism, whether in the form of communism, as in Russia, or state socialism as in the United Kingdom, or the halfway station that we of the United States have reached in "New Dealism."

Statism, whatever the form, is a pit that once in cannot be climbed out of again. And wherever you find it, there you will find the bottom level of living standards.

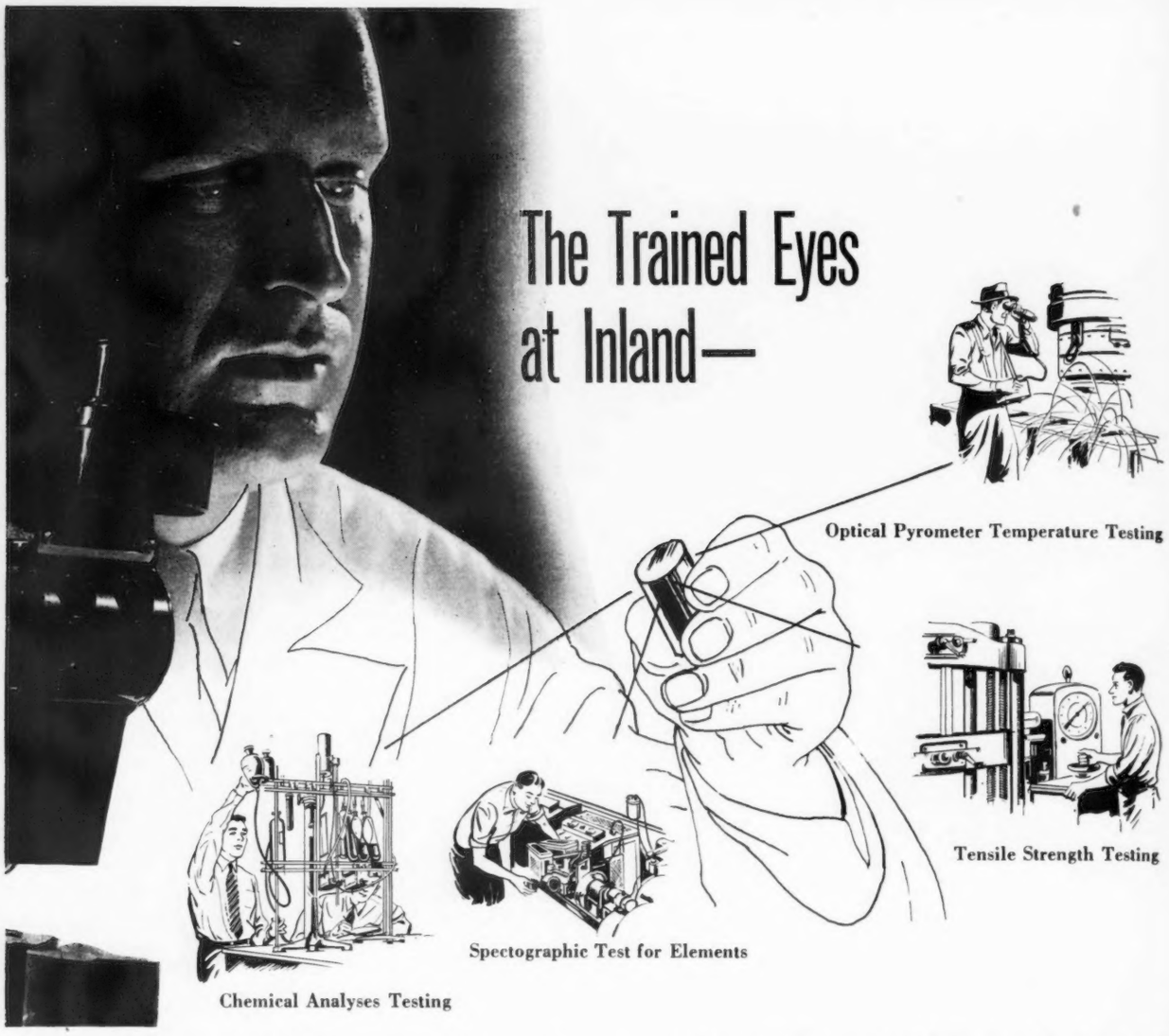
It is easy indeed to follow the gradual path from private initiative and private ownership that leads to the pit of statism, but there is no road back.

Suppose, for example, that the majority of citizens of the Soviets, or the subjects of the gracious King George, should, after a period of years, find that under the regime of state ownership they did not fare as well as those of us who have continued to enjoy the benefits of individual enterprise. And if you want proof of that, just check on the number of automobiles in which workers ride to work in America as compared to the number in those countries suffering from statism.

By what process could a country that has plunged into this pit of statism climb back to private ownership and initiative? It would be as difficult a problem to solve as that of unscrambling an egg and putting it back into the shell in its original form.

The United Kingdom, of course, has as yet dumped only a portion of its enterprise into the pit. By and large it is still a capitalistic country and some people might be found with sufficient money to buy back the nationalized industries. But once the entire economy has been dumped in the pit and there is no private capital left to form an escape ladder, neither revolution nor resolution can get the people out of it.

It is a wise traveler who today looks for a fire escape before he goes to bed in his hotel. And any nation that has wisdom will look for a way out of any social experiment if it should fail. The best way to get out of the pit of statism is to keep away from the edge.



Every day, year in and year out, ton after ton of steel passes the scrutiny of Inland's "trained eyes" . . . Samples are gathered from all operations and subjected to exacting tests before the steel is permitted to be rolled into final form.

Chemical analysis maintains a careful control over all elements . . . holds them in proper proportion and within rigid tolerances. Further control is possible by means of the spectograph and the comparator, that present a graphic record of the exact composition. Optical Pyrometers eliminate guesswork . . . allow operators to control temperatures accurately at all times. In addition, tensile, hardness and metallographic tests are conducted to maintain satisfactory properties. The combined control exerted by these tests is assurance of the quality fabricators can expect . . . and get from Inland Steels.

Inland steelmakers working together closely, carefully on each individual order means *that* order will "measure up" to every requirement when delivered.

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INLAND STEEL

► The long term outlook for capacity steel operations is not promising considering that scrap and pig iron are expected to be short for months. The pig iron shortage is due to a lack of low volatile coking coals.

► Senator Brian McMahon, Chairman, Senate Special Committee on Atomic Energy, has made the gruesome discovery that the atomic bomb is ten times cheaper than other means of destruction. Experts, he says, claim it will cost less than $1 per $300 damage, a mere $100,000 per square mile of destruction, and less than $10 per person killed.

► Probable decline of petroleum reserves may make synthetic liquid fuels necessary within two decades, according to Dr. A. C. Fieldner, chief of U. S. Bureau of Mines. A $15 million plant to be built in Texas is expected to produce gasoline from natural gas for 5½¢ per gal.

► Chain is one of the most critical items of industrial supply. Hoist and conveyor manufacturers are running behind production schedules because of its shortage. One hoist manufacturer has gone so far as to set up production equipment in his plant to manufacture chain, expecting to be in production within the next two weeks. OPA price increase this week is expected to loosen the supply.

► Army Ordnance has undertaken a program of urging industry to (1) disperse its plants; (2) standardize on maintenance parts, and (3) be prepared to tool up for war production in considerably less time than was necessary in past years.

In addition, the Ordnance Dept. is criticizing the lack of plan and haste in disposing of surplus plants and equipment which should have been kept for emergency purposes.

► Government legal staffs are quietly preparing for a wave of litigation over rights-of-way as an aftermath of transfers to private ownership of government-owned pipelines such as Big and Little Inch, it being up to the government to give clear title.

In wartime haste to get pipelines into the ground, construction gangs frequently strayed by a few feet or yards from the originally acquired strip. Few of the many hundreds of property holders affected are likely to pass up the opportunity to press a damage claim against the government.

► The Dept. of Commerce is trying to eliminate the word "foreign" from export-import dealings. They feel that the word has many unpleasant connotations.

From figures available for the first four months it appears that exports have reached the rate of $9 billion annually, while imports for the year will be about $4 billion.

► Railroads are still balking at allowing special low rate on shipment of slabs from Kaiser's Fontana plant to Great Lakes Steel for rolling into sheets. The Railroad's rate committee proposed a compromise but Kaiser is still driving for a rate below $18. Other steel shippers are watching in hopes of using a cut to get lower tariffs on steel shipments throughout the country.

► Carnegie-Illinois stands ready to pay about $60 million for the U. S.-owned facilities at its Homestead, Duquesne and Braddock plants. Although WAA has duly advertised them it expects no bidders since the equipment is an integral part of the three plants. Should the Dept. of Justice object to the sale the government would be left holding a $121 million bag of steel plant equipment.

► A new forging method, using a restricted V-type die, permits forging of high alloy and tool steel type rounds up to 12-in. diam., eliminating bursts and ruptures, reducing strain about 50 pct, and improving internal grain structure.

► The service life of turbo jet engines has been increased tenfold during the past year. Exact reasons for the increase can not be revealed.

► I. G. Farden's experience with the ferrosilicon thermal reduction process to produce magnesium was not a happy one, according to Combined Intelligence reports.

The report also mentions a new process introduced by I. G. for the reduction of iron content and hydrogen; treatment of the molten material by anhydrous ferric chloride. This was said by I. G. to avoid the need to superheat and is successful in almost eliminating hydrogen in the melt.

► Belgian steel producers' export prices are almost double their domestic price; U. S. steelmakers are allowed a 7 pct markup over the ceiling.

► A British firm has developed a method of cladding stainless to iron and steel by diffusion of gases containing the desired cladding material, much on the order of carburizing. Claims are that a clad 0.012-in. thick can be deposited in 2 hr and a clad 1/16-in. thick in 10 hr.

► Belgium's Premier, M. Van Acker, fighting inflation, has resisted union pressure for wage increases, instead has ordered a nationwide cut of 10-pct in prices to consumers.

Thermal Characteristics, Microstructures and Physical

By W. L. MEINHART

Asst. Research Metallurgist, Research and Development Laboratories, Crane Co., Chicago

OCCURRENCE of critical transformations in all carbon and low to medium alloy steels, their dependence on chemical composition and effect on some of the properties of the metal during heat treatment have long been known to metallurgists and engineers. In recent years extensive studies covering hardenability and isothermal transformations of various steels have been made.

Many of the peculiarities arising in the manufacture of steel articles can be attributed to the effect of adding alloying elements to improve physical properties, most of which in turn increase the hardenability and thermal sluggishness. This is indicated by the temperatures at which the critical transformation occurs, when the steels are subjected to a standard uniform cooling after austenitizing, and by the retarding of the speed of this transformation. The type of carbide structure obtained and its distribution in the ferrite matrix is determined by the temperature at which transformation on cooling takes place, as was so clearly shown by previous work.[1, 2]

The addition of certain amounts of some alloying elements to 0.30 pct carbon steel may suppress the transformation on air cooling to as low as 400°F, resulting in higher hardness and lower ductility. Moreover, at such low temperatures, the steel loses much of its plasticity and the critical transformation, which in most of these cases is associated with a considerable dimensional change, may result in internal strain. The relationship between thermal characteristics, microstructures and physical properties will be shown for a series of low and medium alloy cast steels. While this discussion deals with cast steel, the information within certain limitations can likewise we applied to wrought steels.

A number of low and medium alloy steels were made in a 200-lb basic lined high frequency induction furnace using conventional melting and deoxidizing technique. Each heat was cast into keel coupon blocks using greens and molds. The steel blocks were sectioned into convenient blanks, which were heat treated and tested for tensile properties and Charpy impact resistance. A list of the steels, chemical analyses and test data are presented in tables I, II and III.

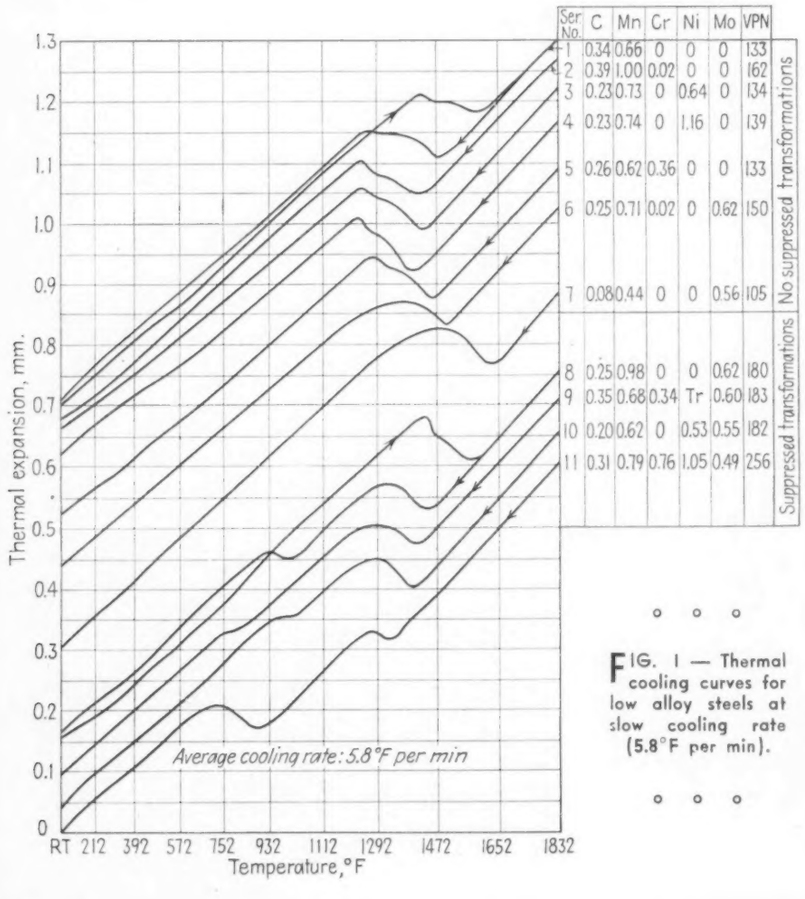


FIG. 1 — Thermal cooling curves for low alloy steels at slow cooling rate (5.8°F per min).

Thermal analyses were made on a universal optical dilatometer in which a specimen, 50 mm long by 4 mm diam, was enclosed in a vacuum of about 2 microns to prevent errors due to scaling at high temperatures. The dilatometric technique employed was similar to that described by Winkler[3] and Gillmor[4]. The samples used in this work were uniformly heated to 1832°F in 2 hr. In most cases, two standard cooling rates were used: (a) Air cooling at an average rate of about 90°F per min and (b) slow cooling at a uniform rate of 5.8°F per min. Still slower cooling rates and some isothermal experiments (transformation from the austenitic to the ferritic state at constant temperatures) were used in connection with some of the steels. All of the resultant dila-

Properties of Some

Low and Medium Alloyed Cast Steels

A study of the relationship of thermal characteristics, microstructures and physical properties of a number of low and medium alloyed cast steels is discussed in this article. This investigation, which covered both rapid and slow cooling rates as well as the influence of specific alloying agents, illustrates a number of points of especial value in determining heat treatment and welding procedures for a given steel. The author points out that much of the data covered herein may also be applied, within limitations, to wrought steels.

tometer samples were subjected to metallographic examination.

The chemical analysis of a representative group of the steels examined is presented in table I. In this particular group, the amount of any one alloying element does not exceed about 1 pct. The carbon content varies between 0.20 and 0.35 pct, except for serial No. 7, which contains 0.08 pct. The latter composition was introduced to show what effect this reduction in carbon has on the transformation on cooling. The decrease in thermal sluggishness with lower carbon applies not only to this particular steel but to others as well.

The dilatometer curves of the samples cooled at a slow rate of 5.8°F per min are presented in fig. 1 and those of air cooled samples in fig. 2. The upper sections of each chart exhibit curves which reveal no suppressed transformations; the lower sections on the other hand contain curves of steels showing split or suppressed transformations. The top curve of each section is drawn with the heating as well as the cooling branches. The remainder have the cooling branches only. Heating curves are omitted in order to conserve space, as all of them are quite similar. The serial number, chemical analysis and Vickers pyramid hardness are given adjacent to each curve.

The thermal curves in both charts can be classified into three groups: (1) Steels having no suppressed transformations on either slow (5.8°F per min) or air cooling (90°F per min); (2) steels having no suppressed transformations on slow, but displaying them on air (fast) cooling, and (3) steels having suppressed transformations on both slow and air cooling.

The beginning of the ferrite to austenite transformation on heating occurs over a range of about 1382° to 1435°F. Increasing carbon and to a lesser extent nickel act to depress this temperature, while chromium and molybdenum have the opposite effect. On cooling, the reverse process takes place; however, the temperatures of its occurrence and the range are quite different from those on heating and vary widely for the different steels.

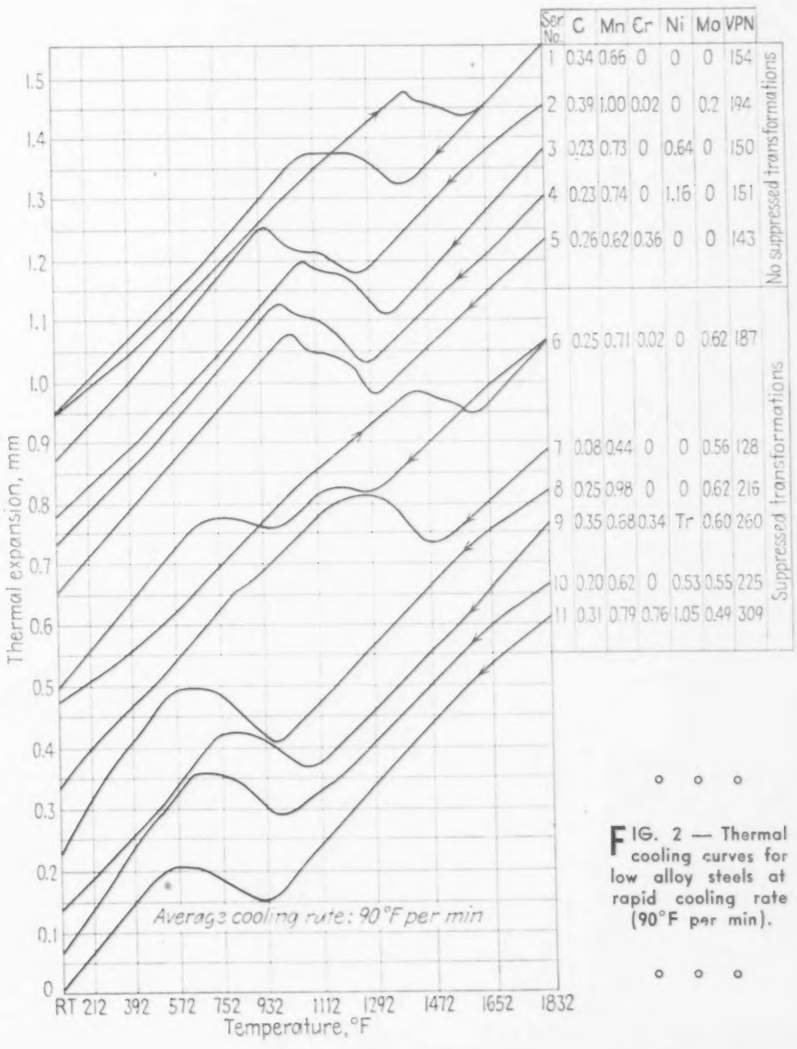


FIG. 2 — Thermal cooling curves for low alloy steels at rapid cooling rate (90°F per min).

TABLE I

Chemical Analyses and Physical Properties of Low-Alloyed Steels

Series No.	CHEMICAL ANALYSIS Si	Mn	S	P	C	Ni	Cr	Mo	Cu	PHYSICAL PROPERTIES Tensile Strength, Psi	Yield Point, Psi	Prop. Limit, Psi	Breaking Strength Psi	Elongation, Pct	Reduction Area, Pct	M.E. Psi X10⁶	Charpy Impact Res., Ft. Lb.	Normalized and Drawn*	Normalized*	Designation	Thermal Characteristics
1	0.33	0.66	0.010	0.019	0.34	0	0	0	0	69,850	38,000	29,000	99,000	27.2	41.1	29.8	21.0	142	154	Carbon, low manganese	
2	0.39	1.00	0.010	0.017	0.31	0	0.02	0.02	0	81,000	44,500	40,000	125,000	28.1	43.9	29.5	19.0	154	170	Carbon, high manganese	No suppressed transformations on either slow or fast cooling
3	0.26	0.73	0.012	0.015	0.23	0.64	0	0	0	70,150	38,500	38,000	113,000	34.0	53.5	26.3	23.0	142	150	Nickel	
4	0.26	0.74	0.013	0.020	0.23	1.16	0	0	0	72,770	41,400	36,000	122,000	28.5	53.0	30.3	23.5	152	151		
5	0.27	0.62	0.017	0.015	0.26	0	0.36	0	0	75,000	37,000	35,500	124,000	32.0	51.5	30.5	20.0	144	143	Low chromium	
6	0.30	0.71	0.013	0.016	0.25	0	0.02	0.62	0	76,500	50,000	43,000	130,000	30.5	54.0	27.0	25.5	136	137	Molybdenum, low manganese	No suppressed transformation on slow cooling—suppressed or split transformation on fast cooling
7	0.30	0.44	0.020	0.013	0.08	0	0	0.56	0	61,800	39,800	42,200	133,000	39.5	69.5	31.0	31.4	130	128		
8	0.29	0.98	0.010	0.015	0.25	0	0	0.62	0	82,950	56,900	49,750	120,000	25.0	47.7	27.8	20.0	179	215	Molybdenum, high manganese	
8A	0.37	1.13	0.013	0.013	0.23	0	0	0.40	0	92,240	66,420	50,750	148,000	23.0	43.7	29.0	13.5	133	233		
9	0.19	0.68	0.010	0.011	0.35	Tr.	0.34	0.90	Tr.	91,000	59,000	57,500	133,000	26.2	45.0	30.0	15.0	194	260	Chromium-molybdenum	Suppressed transformations on both slow and fast cooling
10	0.26	0.62	0.008	0.013	0.20	0.53	0	0.55	0	84,950	54,500	58,000	131,000	25.1	46.7	29.0	20.0	178	225	Nickel-molybdenum	
11	0.28	0.79	0.016	0.013	0.31	1.05	0.76	0.49	0	103,800	74,000	70,000	152,000	21.4	42.0	30.0	15.0	190	309	Nickel-chromium-molybdenum	

* Brinell hardness.

TABLE II

Chemical Analyses and Physical Properties of Medium Alloy (Cr-Mo) Steels

Series No.	CHEMICAL ANALYSIS Si	Mn	S	P	C	Cr	Mo	TENSILE PROPERTIES* Tensile Strength, Psi	Yield Point, Psi	Prop. Limit, Psi	Breaking Strength Psi	Elongation, Pct	Reduction Area, Pct	M.E. Psi ×10⁶	Charpy* Impact Res., Ft. Lb.	HARDNESS** V.P.N. 5 Hr Cool	Air Cool	Thermal Characteristics
12	0.74	0.45	0.030	0.017	0.07	2.33	0.02	60,300	37,200	38,200	140,200	40.8	77.0	29.9	53.3	124	135	No suppressed transformations
13	0.82	0.44	0.025	0.020	0.08	5.22	0.03	84,500	30,600	26,100	144,000	32.5	60.3	30.3	35.3	130	177	Weak suppressed transformation on air cooling; none on slow cooling
14	0.75	0.65	0.015	0.014	0.07	4.53	0.55	66,000	33,800	25,500	111,000	39.0	74.5	30.3	43.1	141	230	
15	0.82	0.69	0.013	0.013	0.30	2.29	0.04	99,300	50,000	52,000	151,700	27.0	57.0	31.0	13.9	226	500	Split or suppressed transformation on air cooling; none on slow cooling
16	0.93	0.75	0.021	0.022	0.27	4.85	0	107,300	69,100	49,100	139,000	20.5	52.0	....	8.0	222	454	
17	0.71	0.68	0.012	0.022	0.32	5.44	0.51	116,600	83,600	73,100	171,200	20.3	52.8	28.3	22.0	484	600	Suppressed transformation on both air and slow cooling

* Normalized from 1750°F, air quenched from 1550°F, and drawn at 1250°F.
** Samples cooled from 1832°F in 5 hr or in air.

FIG. 3—Structure of low alloy steel air cooled from 1832°F (see serial No. 1, fig. 2). Nital etch —X750.

FIG. 4—Structure of low alloy steel air cooled from 1832°F (serial No. 6, fig. 2) having split transformation. Nital etch —X750.

Examination of the thermal curves in figs. 1 and 2 discloses that the following steels do not show any suppressed transformations on either slow or air cooling: (a) Serial No. 1 with low manganese, (b) serial No. 2 containing 1 pct Mn, (c) serials Nos. 3 and 4 containing 0.64 and 1.16 pct Ni, and (d) serial No. 5 with 0.36 pct Cr. Even though the transformation on cooling in these steels is associated with considerable expansion, the metal at the high temperatures has sufficient plasticity to readjust itself without introducing appreciable internal strains.

Fig. 3 illustrates the structural characteristics of this group of samples. Coarse lamellar pearlite and ferrite is formed in the upper part of the transformation range. With decreasing transformation temperatures to the lower end of the range, the finer types of pearlite are produced.

Referring again to figs. 1 and 2, it may be noted that the two carbon-molybdenum steels, serials Nos. 6 and 7, have a partially suppressed or split transformation on air cooling, but a high temperature transformation on slow cooling. Reducing the carbon content of this steel to 0.08 pct, serial No. 7 results in a major portion of the transformation occurring in the upper range during air cooling. Representative microstructures are illustrated in figs. 4 and 5. The ferrite grains and fine pearlite are the softer constituents formed in the upper temperature zone. A "diluted" pearlite type of structure composed of ferrite and carbide arranged in a Widmanstatten pattern, results from the transformation occurring in the lower temperature zone.

The last group of steels, serials Nos. 8 to 11 (table I), have a split or fully suppressed transformation on both slow and fast (air) cooling. Consequently, this group of steels develops somewhat higher hardness values than those previously discussed. On air cooling, the transformation for any of these steels did not begin until 1112°F was reached and in some cases its completion was suppressed to as low as 536°F. The more complicated low alloy steels such as those containing (a) molybdenum and high manganese, (b) chromium-molydenum, (c) nickel-molybdenum, and (d) nickel-chromium-molybdenum, all belong to this group. Typical microstructures of these types are illustrated in figs. 6, 7 and 8. These structures are characteristic of those resulting from suppressed transformations in the low alloy group and are similar to some previously described by Ziegler and Meinhart[5].

TABLE III

Chemical Analysis and Physical Properties of Regularly and Isothermally Treated 5 pct Cr—0.5 pct Mo Steel

Heat No.	CHEMICAL ANALYSIS						PHYSICAL PROPERTIES								
	Si	Mn	C	Cr	Mo	Al	Tensile Strength, Psi	Yield Point, Psi	Property Limit, Psi	Elongation, Pct	Red. Area, Pct	M.E. Psi $\times 10^6$	Charpy Impact, Ft. Lb.*	V.P.N. Hardness	
3400	0.47	0.70	0.28	5.25	0.62	0.05	117,000	91,000	70,000	17.0	47.5	30.0	20.8	253	Regularly heat treated
							101,700	43,200	30,000	19.4	31.0	30.0	7.0	210	Isothermally heat treated at 1340° F

* Average of five tests.

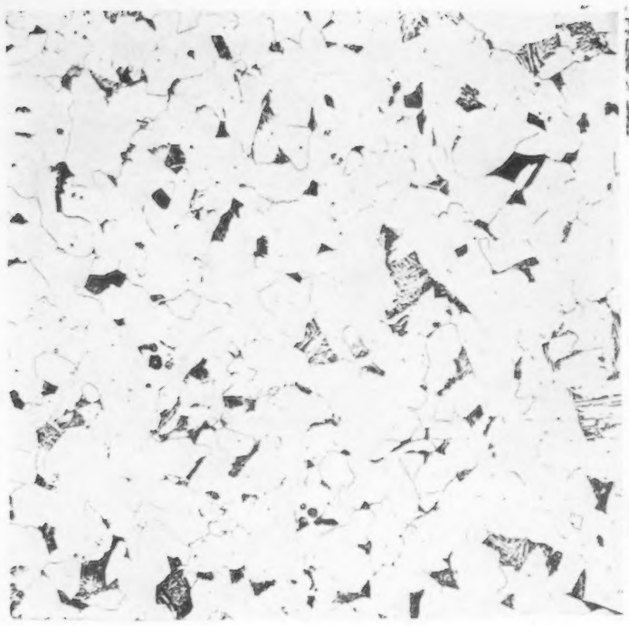


FIG. 5—Structure of low alloy steel air cooled from 1832°F (serial No. 7, fig. 2) having split transformation. Nital etch —X150.

FIG. 6—Structure of low alloy steel air cooled from 1832°F (serial No. 8, fig. 2) with suppressed transformation. Nital etch — X750.

It should be understood that increasing the cooling rate of these steels above that used in the present experiments (as with oil or water quenching), would still further suppress transformation temperatures, probably to the martensite range of even less sluggish thermally steels (shown in the first two groups of table I). The degree of the suppression and the resultant hardness varies in different steels. Hence, information such as this can be utilized for determining the most desirable heat treatment for a given steel. A stress relieving draw for one steel may become necessary only after a quenching operation, while for another, it should also be recommended after normalizing, and in some still more thermally sluggish steels after a slower cooling rate (as in annealing)°.

The bars cut from the cast keel coupon blocks for physical tests were heat treated by normalizing at 1800°F, and drawing at 1200°F. An indication of the relationship between physical properties and thermal characteristics is given in the three groups outlined in table I. The drawing heat treatment at 1200°F tends to reduce the difference in these properties be-

FIG. 7—Structure of low alloy steel air cooled from 1832°F (serial No. 9, fig. 2) with suppressed transformation. Nital etch —X750.

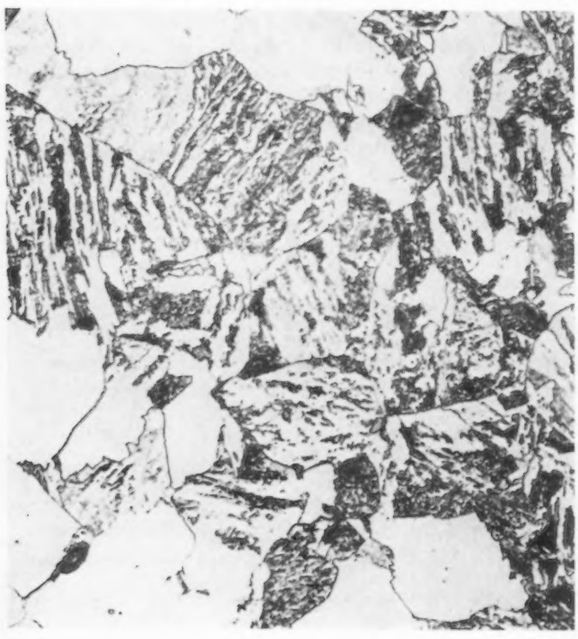
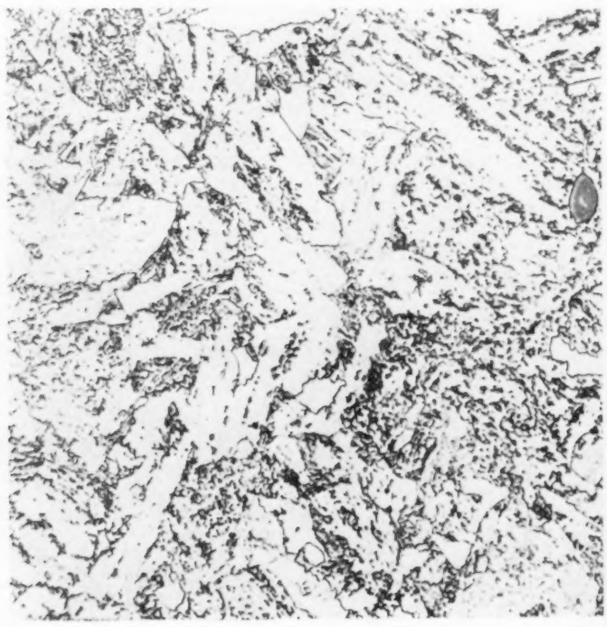


FIG. 8—Structure of low alloy steel air cooled from 1832°F (serial No. 11, fig. 2) with suppressed transformation. Nital etch —X750.



tween steels that have and do not have suppressed transformations. Nevertheless, a series of these normalized and drawn steels with progressively increasing thermal sluggishness show a gradually increasing tensile strength, yield point and hardness. This effect is accompanied to a certain extent by a corresponding decrease in ductility. As can be judged from table I, the yield point and hardness are affected in this respect more than other properties.

Medium Alloy Steels

Steels containing about 2.5 to 5 pct Cr, a trace to 0.5 pct Mo, and carbon contents of about 0.05 and 0.30 pct, were chosen to represent medium alloy cast steels. Chemical analyses and physical properties are presented in table II and dilatometer curves in fig. 9. The 5 pct Cr, 0.5 pct Mo, 0.30 pct C steels illustrate a case of high thermal sluggishness. It definitely is of an air-hardening character and, as is well known, requires greater care and precaution in its manufacture than is necessary for lower alloy steels. A detailed discussion of the characteristics and properties of a series of these cast chromium-molybdenum steels was published by Ziegler and Meinhart.[7]

Dilatometer curves obtained by slow and rapid (air) cooling are shown in the upper and lower sections respectively of fig. 9. Only one, serial No. 12, transformed completely in the high temperature range with both rates of cooling. A typical resultant structure, shown in fig. 10, consists largely of ferrite and a little pearlite.

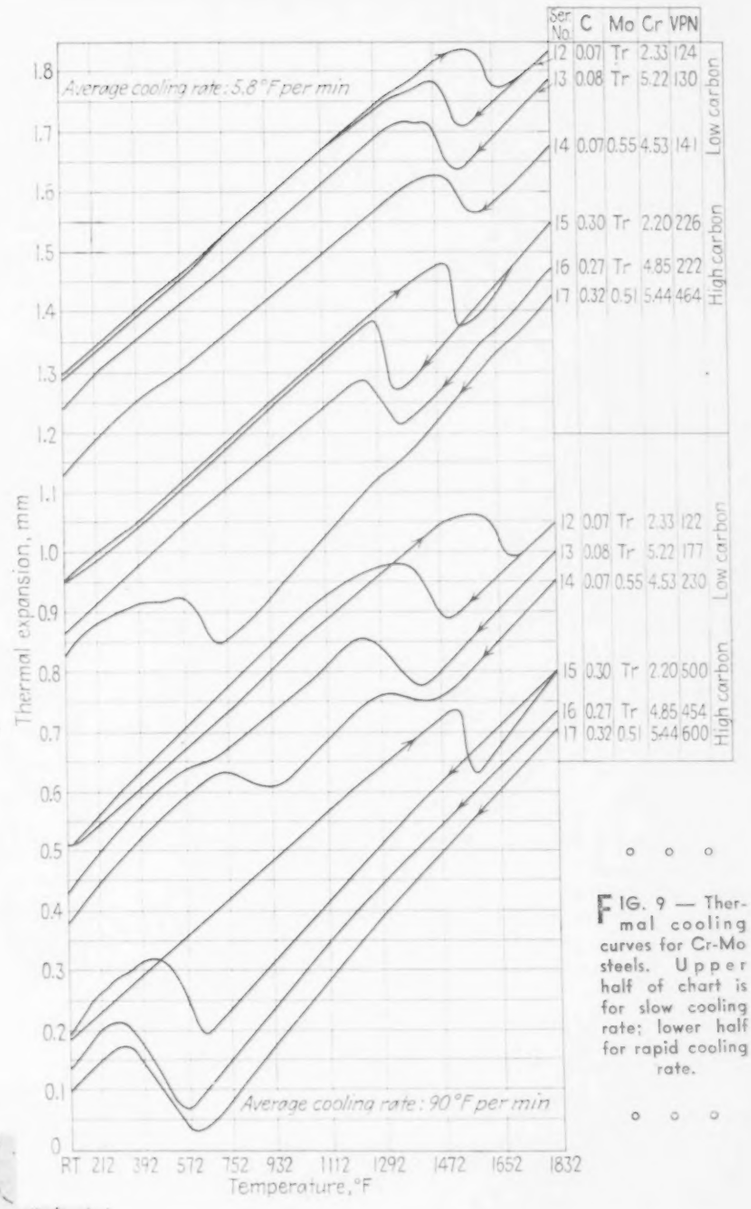
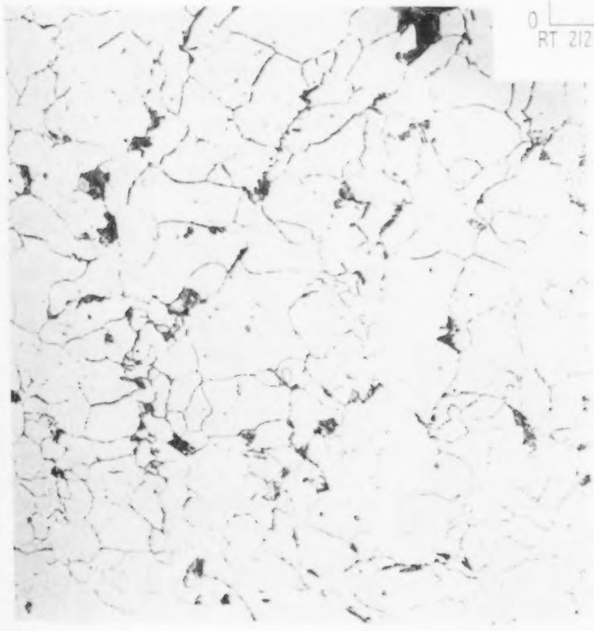


FIG. 9 — Thermal cooling curves for Cr-Mo steels. Upper half of chart is for slow cooling rate; lower half for rapid cooling rate.

FIG. 10—Structure of a medium alloy steel (serial No. 12, fig. 9) cooled from 1832°F at 5.8°F per min. No suppressed transformation. Etched in picral—Hcl solution —X150.



The low-carbon 5 pct Cr, 0.5 pct Mo steel, serial No. 14 (fig. 9), has its transformation split between the low and high temperature ranges on air cooling. The resultant structure of bainite grains in a matrix of ferrite is shown in fig. 11.

All of the high-carbon-chromium steels have their transformations completely suppressed on air cooling with hardness values as high as 530 VPN. A representative picture of a resultant bainite and martensite structure is illustrated in fig. 12. On slow cooling at a rate of 5.8°F per min, most of the transformation in the high (0.32 pct) carbon, 5 pct Cr, 0.5 pct Mo steel was suppressed. The structure formed by this treatment and shown in fig. 13 is composed of small amounts of fine pearlite (dark) in a matrix of bainite. A similar 5 pct Cr steel containing 0.28 pct C was subjected to a uniform 7-hr cooling in one test and 10-hr cooling from 1832°F in another. The results of these slower rates on the dilatometer curves as compared with regular 5-hr cooling are illustrated in fig. 14.

FIG. 11—Structure of medium alloy steel (serial No. 14, fig. 9) air cooled from 1832°F, with a split transformation. Picral—Hcl solution etch —X150.

With a cooling rate of 5.8°F per min (A, fig. 14), the transformation was suppressed to a range of 752° to 482°F producing a hardness of about 500 VPN. By decreasing this rate to 4.1°F per min (B, fig. 14), a definite split transformation was obtained with a reduction in hardness to 286 VPN. The still slower uniform cooling of 2.9°F per min resulted in an almost complete transformation in the high temperature range of (1346° to 1256°F), (C, fig. 14), and a consequent softening to 179 VPN. The latter cooling rate resulted in an annealed type of structure composed of very fine pearlite and ferrite as shown in fig. 15.

The test bars were heat treated by normalizing from 1750°F, air quenching from 1550°F, and drawing to 1250°F. They were tested for tensile properties, Charpy impact resistance and hardness, the results of which are given in table II. The relationship between thermal characteristics and physical properties of the heat-treated bars is similar to that discussed for low alloy steels. The tensile strength and yield point of the low carbon group remain low regardless of alloying elements present. However, with the higher carbon contents and a pronounced increase in thermal sluggishness, tensile strength, yield point and hardness likewise show a proportional increase with some decrease in ductility. As noted before, the effect is more pronounced on the yield point than on the tensile strength. The presence of molybdenum and chromium, particularly in the higher carbon steels, is reflected in greater hardenability and increased strength. A typical microstructure of the high carbon, 5 pct Cr, 0.5 pct Mo steel given the above heat treatment is shown in fig. 16.

The thermal sluggishness of the 0.30 pct C medium alloy steels discussed makes it a convenient material for studying reactions during isothermal heat treatment. This was accomplished by austenitizing it at 1832°F followed by (a) rapid furnace cooling to a desired temperature between 1470° and 722°F, (b) holding for some predetermined time period, and (c) air cooling to room temperature. The portion of the structure transformed during the holding time was estimated from the expansion on the dilatometer curve and checked by metallographic examination. The rates of transformation at the temperatures of the isothermal tests was established by making exposures with the dilatometer light, which results in a series of dots on the film. The rate of austenite decomposition was determined from the distance between these dots.

A compilation of some representative isothermal dilatometer curves obtained from tests made on a heat of a 5 pct Cr, 0.5 pct Mo, 0.28 pct C cast steel,

FIG. 12—Medium alloy steel (serial No. 17, fig. 9) air cooled from 1832°F with completely suppressed transformation. Picral—Hcl solution etch —X150.

table III, is presented in fig. 17. The top dilatometer curve gives both heating and cooling branches. Only cooling curves are shown in the remainder. The final Vickers pyramid hardness is given adjacent to each curve. A few typical microstructures resulting from some of the isothermal tests are shown in figs. 18, 19 and 20. In general, the structures resemble those produced by isothermal tests on eutectoid steels, published by the U. S. Steel Research Laboratory[8].

At 1400° and 1350°F (curves C and D, fig. 17 [The dots and spacings obtained on the original films at the isothermal test temperatures could not be reproduced because of the reduction in size. They are, therefore, indicated by a broken line.]), the reaction was brought to completion in about 10 hr in each case. Resultant microstructures composed of fine pearlite are illustrated in fig. 19.

Only a trace of transformation occurred in an 18-hr test at 932°F (curve G, fig. 17). However, at 752° and 722°F, curve H (752°F curve not shown,) a progressively increasing rate of austenite decomposition occurs with decreasing isothermal temperatures. Microstructures resulting from the 18-hr test at 722°F are composed of bainite and martensite similar to that in fig. 12.

In fig. 21, the results of the above dilatometric tests

and metallographic examination are represented in terms of the familiar S curve. The curves have been extended out to somewhat longer time periods than any used in the dilatometer tests. This data was obtained by estimating metallographically the percentage of austenite decomposition after the long time periods at the isothermal temperatures. This S curve is quite similar to that described by Davenport[2] for a wrought steel of about the same composition.

The temperature ranges employed in the isothermal tests quite clearly defined the pearlite reaction (upper C) curves, but these tests were not carried to low enough temperatures to completely develop the bainite reaction (lower C) curves. It has been shown that with air blast cooling, the transformation is suppressed below the lowest temperatures employed in these isothermal tests. Inasmuch as the martensite temperature range cannot be suppressed (9, 10), none of this structure was formed at the constant temperatures used, but only with further cooling. Therefore, the martensite temperature range is not indicated in

FIG. 13—Medium alloy steel (serial No. 17, fig. 9; see also fig. 12) cooled from 1832°F at 5.8°F per min, showing almost complete suppressed transformation. Picral—Hcl solution etch —X500.

fig. 21. Cohen[11] has suggested that this range be shown within a pair of parallel or constant temperature lines drawn across the chart. The theory and mechanism of the isothermal decomposition of austenite has been discussed in detail in the references cited and in the more recent technical papers, some of which are listed in the references appended to this discussion. [12, 13, 14, 15, 16]

Because of the high thermal sluggishness of the high carbon 5 pct Cr, 0.50 pct Mo steels, they are well suited for studying the physical properties of the reaction products of austenite.

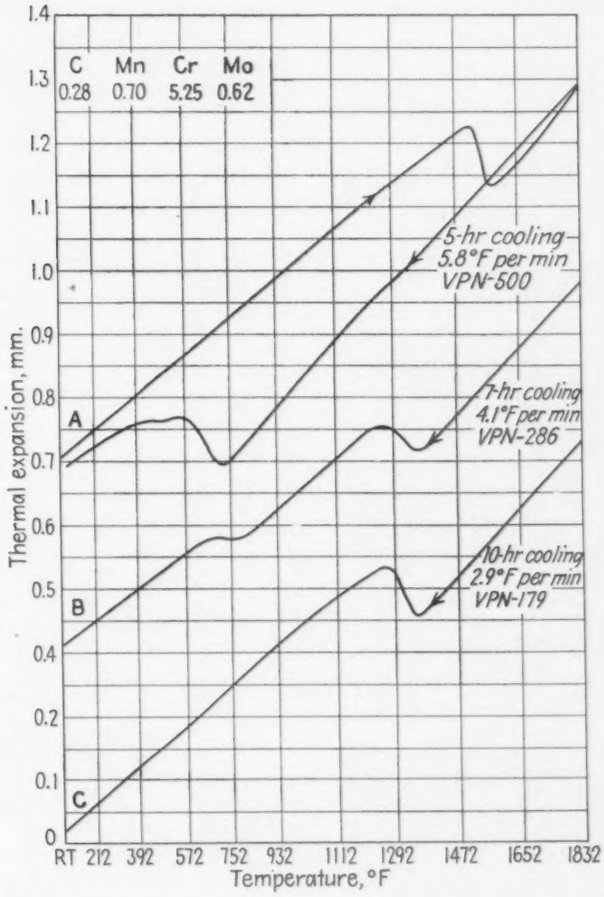
The results of a few tests are shown in table III. One group of steel samples was subjected to the regular heat treatment of double normalizing and drawing similar to that of the bars discussed in connection with table II. Another group of samples of the same steel was austenitized at 1830°F furnace cooled to and isothermally heat treated at 1340°F, near the nose of the S curve, for 15 hr and air cooled.

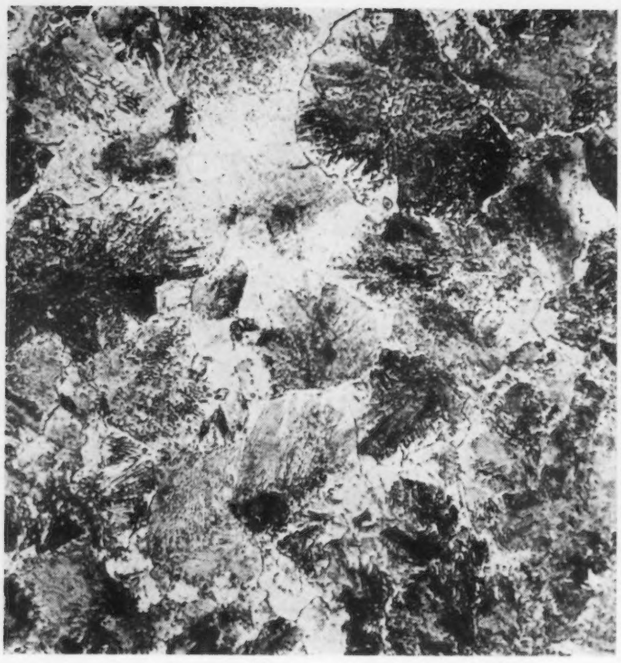
The tensile strength was reduced slightly and hardness somewhat more; however, the yield point and proportional limit were cut to less than half that obtained by the regular heat treatment. On the other hand, elongation and reduction of area remained practically the same. The Charpy impact resistance was most seriously affected, being reduced from 20.1 to 7.2 ft lb. In other words, a pearlitic steel produced by isothermal treatment is softer than that normalized, air quenched and drawn, but it has a lower impact resistance. Physical properties were not determined on bars of this steel heat treated at other isothermal temperatures. In the case of a plain carbon eutectoid steel, it has been shown[17] that both ductility and strength improve with the use of lower isothermal test temperatures, except between the range of 930° to 1110°F and for reduced ductility below about 750°F. With decreasing isothermal temperatures, the hardness values steadily increase.

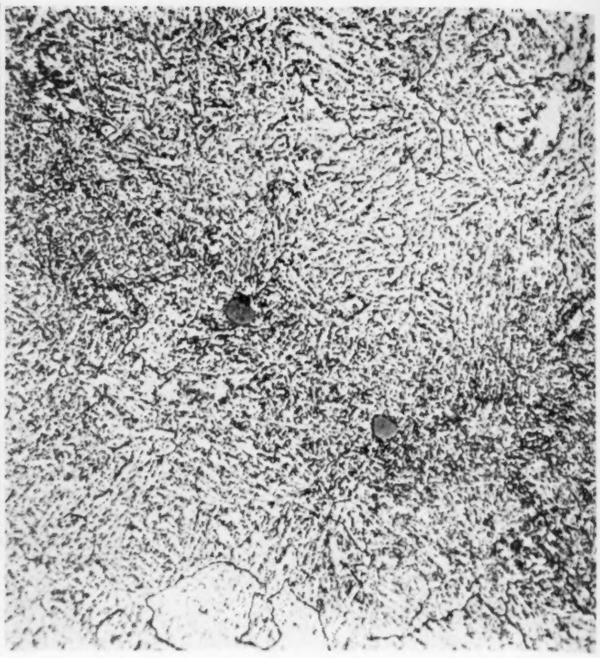
Summary

In summarizing, the development of an air hardening quality in steels is a result of increased thermal sluggishness in transforming from the austenitic to the ferritic state caused by the addition of certain alloying elements.

FIG. 14—Thermal cooling curves of 5 pct Cr—0.5 pct Mo steel at three slow cooling rates.







UPPER LEFT

FIG. 15—Structure of 5 pct Cr.—0.5 pct Mo—0.3 pct C steel (curve C, fig. 14) cooled from 1832°F to room temperature in 10 hr. Picral—Hcl solution etch —X500.

ABOVE

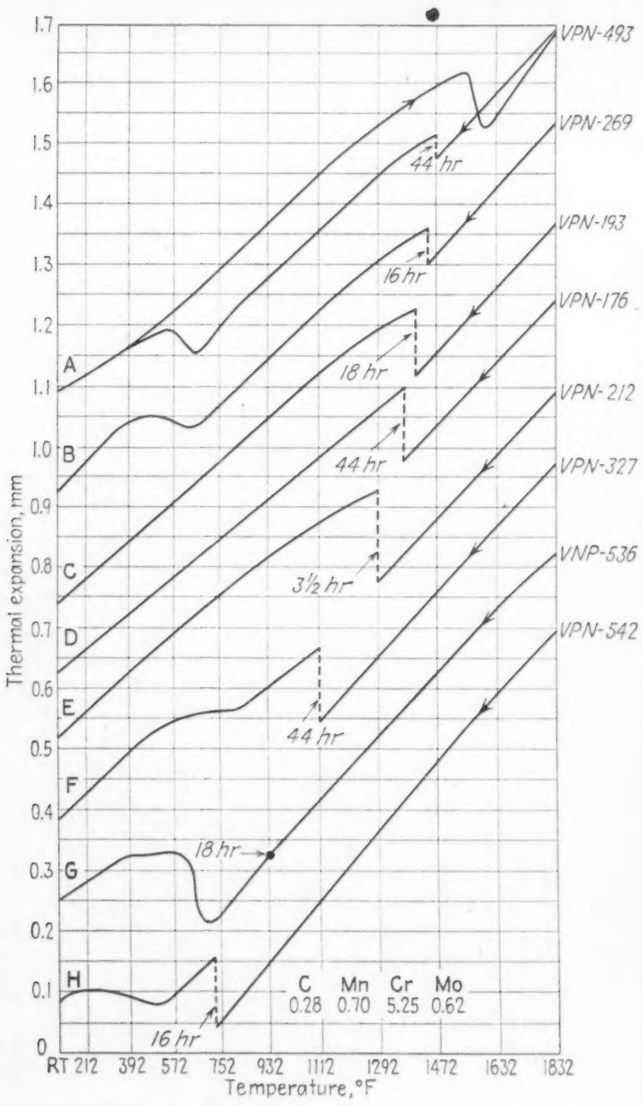
FIG. 16—Structure of 5 pct Cr—0.5 pct Mo—0.3 pct C steel normalized at 1800°F, renormalized at 1600°F, drawn at 1280°F. VPN is 253. Picral—Hcl solution etch —X500.

LEFT

FIG. 17—Dilatometer curves of isothermally treated 5 pct Cr—0.5 pct Mo steel.

BELOW

FIG. 18—Structure of 5 pct Cr—0.5 pct Mo—0.30 C steel (curve B, fig. 17) held 16 hr at 1436°F. Coarse pearlite and ferrite transformed; matrix of bainite and martensite. Picral—Hcl solution etch —X1000.



Classification of some of the cast low alloy steels with regard to thermal characteristics on cooling from above their critical temperatures may be made as follows:

(a) Steels with no suppressed transformations on air or slow cooling, resulting in low hardness and a high degree of ductility such as those containing up to 1 pct Mn, 1 pct Ni, or 0.5 pct Cr.

(b) Steels with suppressed transformations on air, but not with slower cooling rates—those containing 0.5 pct Mo and low manganese.

(c) Steels with suppressed transformations on the slower than air cooling resulting in hardness values up to about 300 VPN. The molybdenum-high manganese, chromium-molybdenum, nickel-molybdenum, and nickel-chromium-molybdenum steels may be included in this group.

The cast medium alloy steels such as the 5 pct Cr, 0.5 pct Mo, 0.30 pct C steels, have suppressed transformations even with a slow cooling rate of 5.8°F per min resulting in hardness values up to about 500 VPN.

Steels transforming at high temperatures on cooling have normal "clean cut" pearlite and ferrite structures. A harder Widmanstatten type of pearlite is formed in the steels having partially suppressed transformations. As the transformation temperature is decreased, the amount of this structure is increased. With further suppression of the transformation, hard bainite and martensite structures are produced.

The author expresses his appreciation to Crane Co. for permission to publish these results; to H. W. Northrup and J. R. Goldsmith for preparation of the steels, heat treating and testing; to A. J. Deacon and H. A. Peterson for dilatometric analyses; and to N. A. Ziegler for his suggestions and comments.

Strength and hardness of heat-treated cast steels are raised in proportion to the increase in thermal sluggishness. This is also accompanied by a gradual decrease in ductility and impact resistance.

Knowledge of the thermal characteristics and existence of suppressed transformations is important in determining the most desirable heat treating and welding procedures for a given steel.

The rate of transformation at constant (isothermal) temperatures after austenitizing was determined for a cast 5 pct Cr, 0.5 pct Mo steel and the results plotted as an S curve. Impact resistance, yield point and proportional limit of a sample isothermally transformed at 1340°F were sharply reduced over that obtained by regular heat treatment. Other properties were only affected to a small extent.

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FIG. 19—Structure of Cr-Mo steel (curve C, fig. 17) held 18 hr at 1400°F. Complete transformation to pearlite and ferrite. Picral—Hcl solution etch —X500.

o o o

FIG. 20—Structure of Cr-Mo steel (curve F, fig. 17) held 44 hr at 1130°F, with formation of fine pearlite (dark); bainite matrix. Picral—Hcl solution etch —X500.

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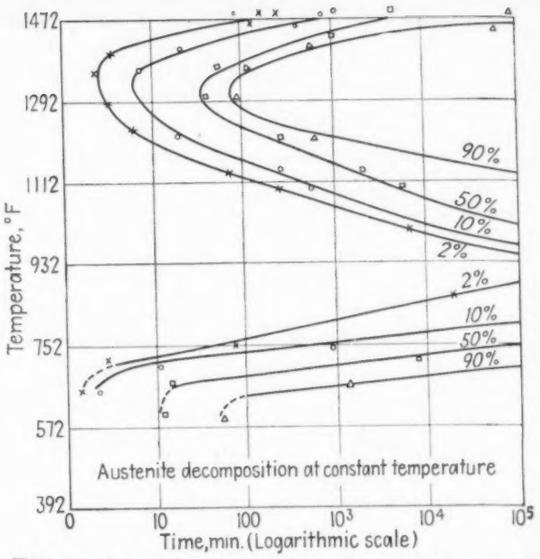

FIG. 21—S-curve for decomposition of austenite in a 5 pct Cr—0.5 pct Mo cast steel.

German Practice in Extruding Zinc Alloys

GERMAN wartime use of extruded bars, shapes and tubes of high stress zinc base alloys as a substitute for free cutting brass is discussed by Sam Tour, Tour & Co., Inc., New York, in a Joint Intelligence Objectives Agency report.

The production of this material was carried out on the same equipment used for the extrusion of similar products of aluminum base alloys. The work was done in many plants, of which four were visited by the author as follows: (1) Dalta Metall Gesellschaft, Dusseldorf, (2) R. G. Schmole, Menden, (3) Osnabrucker Kupfer & Drahtwerk, Osnabruck, and (4) Messingwerke Unna, Unna.

At the Dalta Metall Gesellschaft (Alexander Dick & Co.), 1800 and 2400-ton extrusion presses are used to extrude the zinc alloys. The Zamac alloy (with no copper) is extruded at 3900°F whereas the one with copper is extruded at 430°F. It was claimed that zinc with as much as 15 pct Al extrudes well at 390°F.

R. & G. Schmole, Menden, using 1000 and 2000-ton extrusion presses, extruded large quantities of tubing of a zinc base alloy of the Zamac type known as ZL7. Extrusion was at a temperature of approximately 390°F. The extruded tubing was further reduced by cold drawing to smaller sizes and thinner walls on the conventional design of draw benches.

At Osnabrucker Kupfer & Drahtwerk, Osnabruck, extensive quantities of zinc base alloy products were made. Of the plants visited, this plant produced the largest variety of zinc base alloy products from the largest variety of zinc base alloys. Certain details as to their manufacture procedure for wire, sheet metal and rods are given, with particular reference to the fabrication of zinc-alloy-semi-products.

(1) Wire (0.0709 in.) (Zn Al_4=zamak=lambda according to DIN 1724; 0.8 pct Al; 1 pct Cu, 0.03 pct Mg, remainder zinc). The alloys were smelted in the induction furnace and poured into cast iron chill-molds. Dimensions of cast billet is 4.7 in. diam x 35.4 in. in length. Billets were turned to 3.9 in. diam, 35.4 in. in length, and heated to 220°C (428°F). The material was then hot-rolled in 22 passes down to 0.39 in. diam, at first rectangular shaped then oval, then round. For hot rolling it is important that the temperature of 428°F is not overstepped. The process then continues with (a) scraping drawing down to 0.35 in. diam (in order to scrape off the scale), (b) cold-drawing in 5 passes down to 0.2 in. diam, (c) intermediate annealing at 428°F, (d) cold-drawing in 5 passes down to 0.12 in., (e) intermediate annealing at 428°F, and (f) cold-drawing in 5 passes down to 0.0709 in. diam, with no final annealing.

(2) Sheet metal 0.0787 in. thick; 23.6 in. wide; 78.7 in. long (Zn Cu_1, 0.1 pct Al, 1 pct Cu, the remainder zinc, according to DIN 1724). The alloy was smelted in the induction furnace and poured into cast iron chill-molds. Dimensions of the cast billet were 39 x 24 x 4 in. After the faces were milled down to 39 x 24 x 3.4 in., the billet was (a) heated to 280°C (536°F), (b) hot-rolled down to 0.984 in. thickness in 12 passes, (c) sheared and slit, (d) cold-rolled down to 0.39 in., (e) intermediate anneal at 235°C (455°F), and (f) cold-rolled down to final thickness, with no final annealing.

(3) Rods (Zn Cu_4 Pb_1 with 0.1 pct Al, 4 pct Cu, 1 pct Pb, the remainder zinc, according to DIN 1724). After smelting in the induction furnace, the alloy was poured into cast iron chill-molds. Dimensions of billets were 7 in. diam, 35 in. long. These were cut to length (not turned), and heated to 320°C (608°F), after which were hot-extruded 1 to 6 rods, according to diameter. Extruded diameter was 0.0236 to 0.0394 in. larger than the required final diameter. Rods then cold-drawn to size without an intermediate anneal, with no final annealing.

Messingwerke-Unna plant was reported producing large quantities of tubing and strip from a zinc base alloy containing 1 pct Cu, 0.5 pct Mn and no aluminum. Extrusion temperatures of 280°C (536°F) were reported. This plant also claimed to have produced large quantities of zinc base alloys of a free turning variety as a substitute for free turning brass.

Practical Tool Room Heat Treatment

Salt baths play a prominent role in heat treating tool steels. The types of salt baths in current use, as well as the use of salt baths in interrupted and isothermal quenching, are described in this concluding part of a four-part article.

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USE of molten salt heat-treating baths has become increasingly popular in the heat treatment of all types of steels, and particularly in the heat treatment of tool steels. There are two main types of salt baths, one type which is termed neutral, and the other type which is called active. Actually there is no commercially used salt bath which is strictly neutral over its entire operating range. Either the bath is slightly oxidizing or slightly carburizing in nature. The neutral type of bath is used almost entirely for the heating of work on the surface of which it is particularly important that no decarburization or discoloration takes place. These baths are of three main types, each type covering a different temperature range and actually having a different use.

The first three parts of this article published in the issues of June 6, 13 and 20 discussed (1) *the classifications of tool steels and heat treatment,* (2) *decarburization and furnace atmospheres and* (3) *the use of salt baths in heat treating practice.*

The low temperature salts which are mainly used for the tempering of steel have an operating range of approximately 300° to 1250°F. This low temperature salt bath heating medium is essentially composed of nitrates and nitrites of the alkali metals. This type of bath is oxidizing in nature and sometimes is used for the sole purpose of coloring steel since color oxides are formed on the surface of the work during prolonged heating. It is important that this type of salt bath should not be operated above the maximum temperature recommended by the manufacturer of the salt bath mixture, since decomposition and breakdown of the salt take place when these maximum temperatures are exceeded.

The second type of neutral heating bath is used for heating in the medium temperature ranges and is composed in general of eutectics of different combinations of chlorides or chlorides and carbonates. These medium temperature baths have an operating range of from 1050° to 1700°F. When carbonates are present in this type of bath, there is a tendency towards decarburization of the steel and it is sometimes the practice to incorporate cyanides in the salt bath formula in order to prevent the formation of a soft skin. With these baths it is necessary to use a rectifier such as boric acid to remove oxychlorides and carbonates which are the natural decomposition products produced during the operation of this type of bath. These rectifiers serve to convert these decomposition products into a sludge which may be easily removed from the bath.

The third type of bath[1] is used in the heat treating of high-speed steels and has a working range of 1800° to 2400°F. These baths are composed essentially of mixtures of barium chloride, borax and sodium silicate. This high-melting-point type of salt is actually a glass and presents a foolproof method for heating high-speed steel without the attendant difficulties in preventing decarburization, which are met in other methods of heating. It is necessary with these super high temperature baths to incorporate the use of a rectifier and to maintain close control of the bath composition.

In the heating of salt baths where continued operation is the practice, it is generally the practice in modern tool rooms to use the immersed electrode type of heating unit. This is a particularly trouble-free method of heating and does away with the necessity of replacing the pots which is the main trouble encountered where the medium and low temperature baths are concerned.

[1] *Some further considerations of this type of bath is contained in the article "Salt Bath Heat Treatment of Stainless Steel,"* THE IRON AGE, *May* 30, 1946.

The main advantages derived from the use of neutral salt baths in preference to heating steel by the other methods are: (1) Greater uniformity of temperature control; (2) more uniform heating between dissimilar sections; (3) protective film provided on work from bath to quench; (4) faster heat input and greater production; (5) minimum distortion and warpage, and (6) simpler atmosphere control from the standpoint of equipment and operation.

The use of certain activated salt baths has found

increasing application in the treating of tool steels. These activated baths, or what is termed case-hardening baths, work on the principle of adding carbon and/or nitrogen to the surface of the work, which addition makes for a very hard and wear-resistant case. These baths are most commonly known as cyanide baths and may be separated into four classifications; straight cyanide baths, accelerated baths, cyanide carburizing baths and nitriding baths. All of these baths contain cyanide salts of one type or another together with other agents which tend to accelerate the carburizing action.

Actually there are not many applications in the treating of tool steels where it is desirable to carburize. However, there are numerous applications of nitriding, especially in the treatment of high-speed cutting steels which are not subjected to shock. All four types of cyanide baths will be discussed, since nearly every tool room is called upon to do a considerable amount of case hardening of one type or another. Cyanide baths in general, as exemplified by the straight cyanide type, have the unique advantage of supplying nitrogen as well as carbon to the case. Nitrogen increases the surface hardness to a very marked degree, and it is possible by the selection of bath composition and the time and temperature relationship to control the nitrogen pickup in the case. The cyanide in the bath does not actually perform case hardening, but the heating of cyanide in contact with air causes decomposition of the cyanide to cyanate with the accompanying formation of free nitrogen and carbon, these two elements causing the case to be nitrided and carburized respectively.

Controlling Cyanide Hardening

There are four main factors which control cyanide hardening: Time of treatment, operating temperature, composition of the bath, and the type of steel being treated. In practice, the time of treatment may vary from 5 min to an hour or more depending on the type of bath being used and the type of case required. Since the depth of case does not increase in direct proportion to the time in the bath, long treatments are not economical. When heavier cases are required, it is necessary to use the accelerated cyanide type of bath or the carburizing cyanide type of bath. It is important that accurate temperature control be maintained since the activity of the bath and the type of case which is formed largely depend on the temperature which is used. The operating temperatures for the straight cyanide type of salt bath will range from approximately 1400° to 1650°F, depending on the upper critical temperature of the steel being treated. Case hardening, of course, takes place much faster at the higher temperatures; wherein precautions must be taken to guard against excessive grain growth.

The composition of the bath is also important and in general it will be found that a bath in cyanide will yield cases high in carbon and low in nitrogen. For example, a 5 pct cyanide bath will yield a predominantly nitride, and consequently shallow, case, while a 40 pct cyanide bath will yield a high-carbon, low-nitrogen case of substantially greater depth on low carbon steel. Another factor affecting the ratio of carbon to nitrogen in the case is the operating temperature, it being generally found that with a high temperature carbon predominates, while with a low operating temperature, the percentage of nitrogen in the case increases.

The type of steel which is to be carburized is also important. Within the two main types, carbon steels and low-carbon alloy steels, it is found that grain size and the normality of the steel is very important. Carbon steels consist of two extreme types, the fine grain and the very coarse grain types, while alloy steels can be supplied in any specific grain size. Fine grain steels are difficult to case harden and it will be found that the case formed on the steels will be very shallow but quite high in carbon, while in the coarse grain steels the gradation zone in the case depth will be quite wide. The fine grain steels, of course, will have the advantage of greater toughness and less tendency to distort during case hardening.

The normality of the steel is also important. Abnormal steels will tend to give spotty case hardening results and should be avoided. Molybdenum and vanadium are alloy additions having strong carbide forming tendencies and are often added to steels to increase their hardenability and resistance to softening on tempering. Vanadium, however, decreases the depth of carbon penetration. Nickel increases the temperature range of stable austenite and is sometimes used to reduce the tendency of other alloys to raise this temperature.

In general, it may be said that the effect of alloy constituents on the ease of carburization is as follows: When the alloy element produces a lowering of the upper critical temperature of steel, that is, an increase of temperature range of stable austenite, the temperature range for efficient case hardening will be lowered. But if, on the other hand, the temperature range of stable austenite is reduced, the temperature range for efficient case hardening will be raised commensurately with the increase in the upper critical temperature of the alloy. Sometimes the variation in grain size under some conditions may be great enough to invalidate these conclusions.

The accelerated cyanide bath is one in which barium salts have been added to increase the carburizing activity. These are mainly used where a short time at temperature, a lower bath temperature and a greater depth of case are desired. Generally the minimum cyanide content of an accelerated cyanide bath is 35 pct. These baths are, however, capable of operating at higher temperatures than the plain cyanide bath, and as a rule a graphite cover is used. This protecting cover affords several important additions in operation such as reduced fuel cost, a greater pot and refractory life, improved sodium cyanide efficiency of the bath, and in the case of electric furnaces, a longer resistance element life. In general, it may be said that in using temperatures above 1600°F with this type of bath, carbon will predominate in the case.

The third type of cyanide bath is the so-called carburizing type and is essentially designed for the production of deeply carburized cases at the usual carburizing temperatures of 1650° to 1750°F. This carburizing type of bath is much the same as the accelerated cyanide type, but employs a higher percentage of catalysts of the barium type. The presence of this higher percentage of catalysts makes it possible to have a full bath activity with cyanide contents as low as 10 pct. Because this type of bath has a very low nitrogen content, rapid carbon absorption is permitted,

since it is known that the presence of a nitrogen case interferes with the rapidity of carbon pickup.

The fourth type of cyanide bath is the so-called cyanide-nitriding bath. This type of bath is generally made up of 60 pct sodium cyanide and 40 pct potassium cyanide. The melting point of this mixture is considerably lower than that of the other types just discussed, melting taking place at approximately 925°F when the bath is new. After aging, this melting point will fall to approximately 800°F. The operating range generally used is 925°-1125°F. The use of this bath that the steel must be within a temperature range of 1050° to 700°F.

It is the practice in some tool rooms to use the nitriding bath in conjunction with either a first or second draw when high-speed steels are being treated. It is important, as pointed out before, to guard against the formation of too deep a case. It is also highly desirable to employ a stress relief or tempering treatment after the tool has been nitrided; tempering temperature in this case need not be above 500°F, which temperature will be sufficient to relieve any stresses

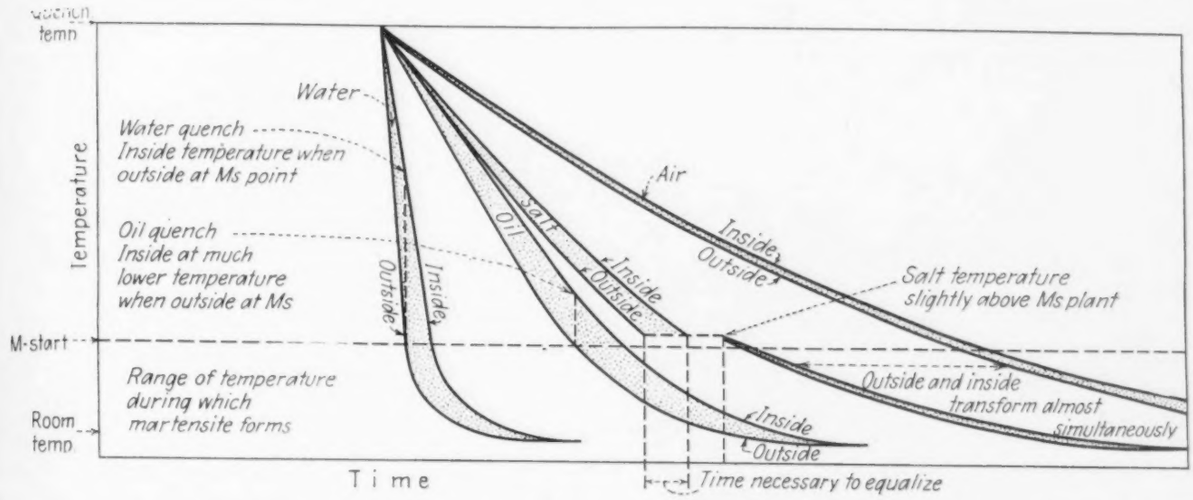


Fig. 8—Cooling rate of outside and center of similar steel samples quenched in water, oil, salt bath and air (Shepherd).

is confined to the treating of high-speed cutting tools and the time in the bath will range anywhere from 5 min to 1 hr, the general practice being to treat tools such as milling cutters, reamers, taps, etc., for 20 to 35 min. The object in treating is to obtain a very thin case—0.0005 to 0.002. It has been found in the operation of this type of bath that favoring the low part of the temperature range—925° to 975°F—will make for a very hard, dense and shallow case with Rockwell C hardnesses running as high as 75. The use of a higher nitriding temperature makes for a coarser and softer case but with a fair increase in penetration. It has generally been found that operating higher than 1050°F does not materially benefit the tools and there is the added effect that as the higher operating temperatures of this bath are reached, there is an accompanying increase in the decomposition rate of the bath itself.

In order to reap the maximum benefit from nitriding, it is important that the surface of the steel be free from any decarburization and from any foreign material. The presence of oil or grease even in very thin layers will materially affect the efficiency of the nitriding operation. It is also important, in order to achieve the best results on cutting tools, that the surface to be nitrided be as smooth as possible. If it is possible to hone the cutting edges which are to be treated, a definite increase in tool life and performance may be obtained. Straightening of tools which have been nitrided is possible; however, all straightening must be performed when the tool is hot. This means that have been set up in the cooling of the nitrided work. It is considered good practice to preheat tools in an air draw furnace to the temperature of the nitriding bath, thus insuring against excessive variation in the bath temperature when the tools are introduced into the bath.

Isothermal Heat Treatment

It is only recently that the peculiar properties of molten salt baths as applied to the hardening of steel have become fully recognized. We have all heard of the terms austempering, martempering and isothermal quenching. These all have to do with the use of what we might term interrupted cooling rates or, in other words, interrupted quenching.

The interrupted quench has been used by heat treaters for quite some time. The practice usually followed consists of a timed quench for a very short period in an intense cooling medium (water, oil), followed by a transfer to another furnace maintained at some relatively low temperature or by simply allowing the steel to cool in air, thus allowing the transformation of unstable austenite to the hard constituent martensite to take place at a very much slower and a more uniform rate. The main value of the interrupted quenching practice in the case of a hardening operation lies in its ability to allow the steel to transform in such a manner that the least amount of quenching stresses are locked up in the steel. On quenching hardenable steel parts in the conventional manner very

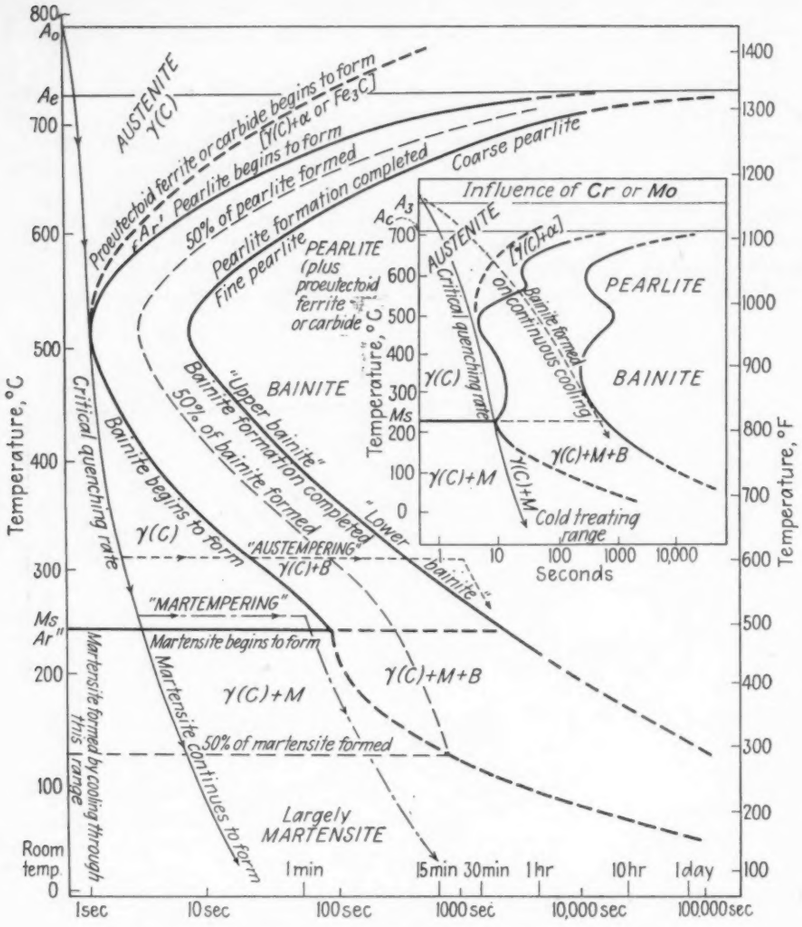


Fig. 9—Typical schematic Time-Temperature-Transformation curve.

large stresses can be set up due to the fact that steep thermal gradients are built up between the case and core sections of work which has any appreciable section. This also occurs in the case of work which is composed of adjoining thick and thin sections. As we all know, the different quenching media commonly used afford different rates of cooling. It has been found that molten salt baths have the ability to give quenching rates which are only slightly slower than that given by an oil quench. Fig. 8 illustrates the difference in the quenching rates of water, oil, molten salt, and air. It also illustrates the relative temperature difference between the surface and center of a steel cylinder quenched in the above-mentioned quenching media.

Assuming that the steel in the cylinder is hardenable when quenched in either water, oil or molten salt, the quenching speed in each case exceeds the critical cooling rate of the steel and full hardening is obtained since martensite is formed in each case. Due to the mass effect which is governed by the section of the work being quenched, the inner portions will naturally lag behind the surface in their speed of cooling. This means that the formation of martensite takes place in the outside or surface section first, since it reaches the Ms point (martensite formation starting point) first and the transformation from austenite begins and progresses to completion. Thus the surface is hardened or set before the center has begun to transform. A short time later the center reaches the Ms point and it too transforms from austenite to martensite to the accompaniment of considerable expansion which is always associated with this transformation. The occurrence of this expansion is clearly illustrated by the dilation curve of a 1 pct carbon tool steel shown in fig. 5, issue of June 20, 1946. Thus, the inside section of the mass expands in transformation or hardening and this produces a considerable amount of stress in the surface section which is already hardened and thus is unyielding. It is this very phenomenon which accounts for the considerable amount of cracking which is often encountered in the hardening of hardenable steels whenever the work being quenched possesses an appreciable section. Using the interrupted salt bath quench, it is possible to cool the steel at a rate which is above its critical cooling rate to a point just above the Ms temperature and to hold it at this temperature until the cross-section of the work being quenched has reached a uniform temperature. At this time the work may be removed from the bath and allowed to cool naturally below the Ms temperature at which time the formation of martensite allows full hardening to take place. It will be appreciated that, since the work is uniform in temperature when held just above the Ms point, there will be no appreciable temperature gradient existing in the work during further cooling—which will make for dangerous stresses during the transformation from austenite to martensite when air-cooled from this equalizing temperature (which is generally in the range of 400° to 500°F).

The practice just described is known as martempering. Shepherd describes this heat-treating process as one which uses the mechanism of martensite formation to harden steel without imposing internal stresses on the metal and which allows temperature equalization to take place throughout the steel part before it undergoes any modifying change. The Ms point for most of the low alloy hardenable steels is about 400°F. In other words, on accelerated cooling, unstable austenite is retained down to about 400°F and thus in martempering, as described above, the steel may be cooled suddenly from the high quenching temperatures down to a point just above the Ms temperature for the particular steel and held at this point until any temperature gradient in the work has disappeared. Cooling from this temperature then produces a martensitic transformation condition with consequent elimination of quench-cracking difficulties. Fig. 9 shows a "Time-Temperature-Transformation"

diagram for a certain steel with the cooling curve of the martempering operation.

Calculation of the Ms point of steel from its chemical analysis is not difficult, and Payson and Savage have furnished an algebraic formula which simplifies the computation. This formula is as follows:

Ms Temperature (°F.) = 930 − (570 × pct C) − (60 × pct Mn) − (50 × pct Cr) − (30 × pct Ni) − (20 × pct Si) − (20 × pct Mo) − (20 × pct W)

In comparing the relative magnitude of the multiplying factors associated with each of the different hardening elements, carbon is the element which has the greatest effect in decreasing the Ms point temperature. In the case of air-hardening steels such as the 18-4-1 high-speed type the Mf point (martensite finish transformation temperature) is, under certain conditions lower than room temperature. It is for this reason that subzero treatment can be used to effect the elimination of any austenite which may be retained or untransformed at the finish of a quench to room temperature. It is for this reason, also, that a double draw is recommended for high-speed steel so as to eliminate the presence of any untempered martensite which may be present after cooling from the first draw. This untempered martensite forms from retained austenite which will invariably be present in small percentages in high-speed steel during the first draw.

A salt bath used for the martempering operation is generally of the nitrate-nitrite type and is held at a temperature of approximately 425°F. The bath should have sufficient volume and should be fitted with a cooling apparatus so as to allow maintenance of this temperature at all times during the quench. Shepherd, who has been mainly responsible for the development of the martempering process, has written a number of papers describing the theory and practice of martempering.

The practice of austempering also involves an interrupted quench, this is a heat-treating process in which the transformation of austenite is so controlled as to yield a product intermediate between martensite and pearlite possessing high strength coupled with high ductility.

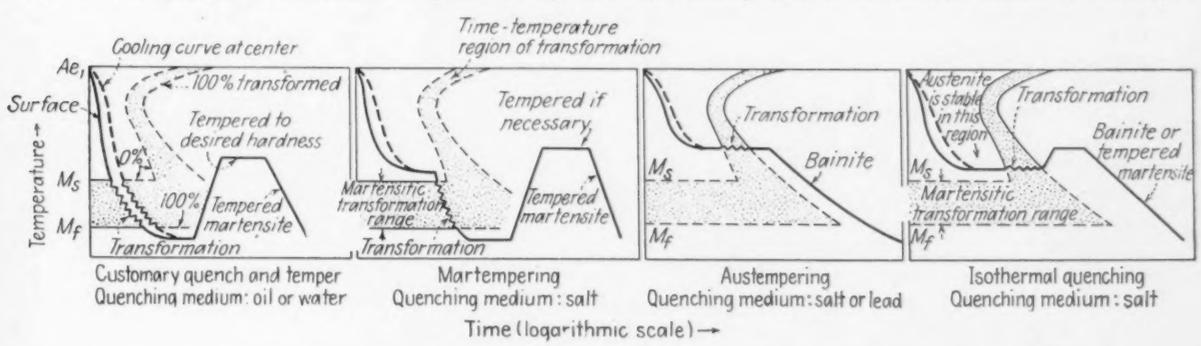
Alloy steels with a carbon content approaching the eutectoid composition (0.85 pct carbon) of plain carbon steel may be austempered by quenching in a suitable molten salt bath maintained between 400° and 800°F. The steel is held within this range at a predetermined temperature until it is transformed isothermally to a structure known as bainite. This bainite structure will possess about the same hardness as that of tempered martensite which has been formed by tempering to about the same temperature as the isothermal holding temperature used to form the bainite. In addition, this bainitic structure possesses considerable ductility. The temperature of the salt bath and the holding time at this temperature are determined first of all by the final hardness desired for the work and the hardenability of the steel which is being used. This temperature and holding time may be determined by a number of different means which are too lengthy to describe in full here; however, it is possible to determine these two factors easily after one has become familiar with the use of the S-curve. One such curve is shown in fig. 9, which illustrates the austempering cycle. Increasing the carbon or alloy content or grain size, shifts the curves to the right; increasing the carbon content also lowers the Ms (martensite starts to form) temperature, and increasing the alloy content lowers the Mf (completion of martensite formation) temperature.

Isothermal quenching is a variation of the two treatments which have just been described and consists of heating to the hardening temperature or austenitizing temperature followed by a quench in an agitated heated salt bath held at 450°F. Holding at this temperature for sufficient time to permit isothermal transformation is done and this, again, is followed immediately by heating in a third salt bath at a higher temperature, this part of the treatment serving as a draw. This method allows isothermal transformation to take place at a low temperature and produces a bainite type structure having a high hardness, and then draws the steel back at a higher temperature to the required physical properties in much the same way as in the conventional quench and draw. This allows heavier sections to be heat treated than could be handled safely in the conventional austempering treatment. Fig. 10 illustrates diagrammatically the heat treatment cycles representative of the four important quenching methods, namely, the conventional quench, martempering, austempering, and isothermal quenching.

An extensive bibliography covering all phases of the heat treatment of tool steels was published with part I of this series of articles and appeared in the issue of June 6, 1946.—Ed.

The use of the three interrupted types of quench described are not particularly applicable or necessary to many of the heat treating jobs encountered in the hardening of the conventional tools. However, there are many cases in tool room heat treating when the use of these isothermal treatments is necessary in order to attain the desired results or to avoid quench cracking.

Fig. 10—Time-Temperature-Transformation diagrams showing typical heat-treating cycles for four different methods of hardening.



How to Weld Aluminum

Modern techniques of arc welding aluminum are discussed in detail in this article. Metal arc, manual and automatic carbon arc, atomic hydrogen, and inert gas shielded arc welding methods are discussed and recommendations are also made as to electrode size and type, joint edge preparation, and general operating technique.

THE use of arc welding as a means of joining aluminum parts is becoming increasingly popular. Arc welding has some advantages over other welding methods, i.e., its ease of edge preparation and faster welding speed. Arc welding methods also provide a concentration of heat which tends to prevent excessive expansion of the pieces to be joined and consequently reduce distortion.

Aluminum may be arc welded by any of four different processes. Three of these processes, metal arc, carbon arc and atomic hydrogen, are in general use.

The first article in this four-part series, prepared by the engineering staff of Reynolds Metals Co., appeared in the issue of June 20, and dealt with the weldability of various alloys and the technique of gas welding. Two subsequent articles will review spot welding and flash and seam welding.

The fourth process, inert-gas shielded arc welding, although developed primarily for the welding of magnesium, has been applied successfully to aluminum.

Arc welding, when applied to aluminum, has its limitations as well as its advantages. The thinner the metal to be welded, the more difficult the application becomes, particularly in metal arc welding. Pieces 0.039-in. thick have been butt welded successfully. For production purposes, however, it is much safer to place the minimum thicknesses for metal arc butt welding applications at ⅛ in. although thinner material has been welded satisfactorily. For fillet welds, ⅛ in. is again the minimum recommended thickness for metal arc welding. For gas tight welds made with the metal arc, ¼-in. plate thicknesses are generally regarded as the minimum for efficient welding, although experienced welders can make satisfactory welds on thinner plate thicknesses.

TABLE V
Arc-Welding Electrode Data

Thickness of Sheet (In.)	Electrode Size (In.)	Current (amp)
1/16	1/8	45–55
1/8	1/8	75–85
1/4	5/32 or 3/16	125–175
3/8	1/4	225–300

Little plate edge preparation is necessary in welding aluminum by the metal arc method. For plates and sheets less than ¼-in. thick, little or no edge preparation is required. Plates over ¼-in. thick should be beveled for a 60° or 90°V unless the piece is to be welded from both sides. In the latter case, it is not necessary to bevel until the thickness of the pieces exceeds ⅜-in.

When aluminum plates are beveled, it is generally recommended that the shoulder thickness be between 1/16 and ⅛-in. However, ¼-in. shoulders may be welded satisfactorily. On thicker plates, U grooves should be used to provide sufficient space for electrode manipulation. A root opening of 1/32 to 1/16-in. is desirable.

It is nearly always necessary to use a backing strip in butt welds if complete penetration is to be obtained without dripping metal from the underside or without burning holes. Copper, graphite, steel or asbestos backing strips may be used. In order to allow space for the flux and a penetration bead, the strip should be provided with a half oval groove about ½-in. wide and ⅛-in. deep; this groove is placed directly beneath the weld joint.

On the welding applications involving thick plates or complicated welds, it is desirable to preheat at 250° to 400°F. Because of the high heat conducting properties of aluminum, pre-heating is nearly always necessary on thick plates in order to maintain the weld puddle. The pre-heating of thick plates will also avoid porosity due to too rapid cooling at the start of a weld. On complicated welds, pre-heating is used in order to avoid distortion.

It is recommended that parts be jigged for arc welding just as they are for gas welding, though the jigs need not be nearly so rigid. Joints should also be tacked. The spacing of the tacks will vary with the thickness of the stock; for instance, the closest tacking is confined to the thinnest stock.

Heavily-coated electrodes are always used in metal arc welding. This is essential for the coating must be able to perform several functions which greatly influence the success of the welding application. A satisfactory flux coating will: (1) rapidly dissolve the oxide film on the base metal into a slag of lower density than the molten weld metal, (2) stabilize the arc and (3) cover the weld to prevent excessive oxidation during cooling.

Practically all metal arc welding is done with the electrode positive (reverse polarity). For best corrosion resistant qualities, an electrode having the same composition as the base metal is generally recommended. Many users, however, prefer a 5 pct silicon, 95 pct aluminum electrode because of its superior fluidity at welding temperatures.

Coated electrodes are available in ⅛, 3/32, 5/32, 3/16 and ¼-in. sizes. In general practice, ⅛-in. electrodes are used on ⅛-in. or thinner sheets and ¼-in. electrodes on plates ¼-in. or over. The recommendations are not rigid and may be varied to suit the welding operator's preference. See Table V.

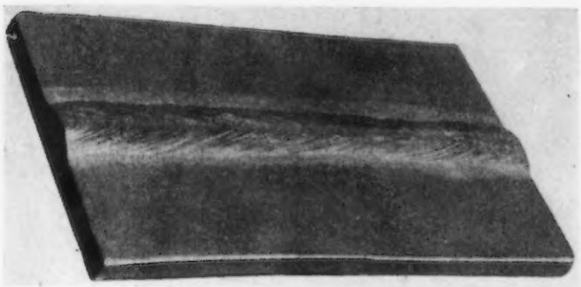


FIG. 7—A dense uniform bead of weld metal deposited by automatic carbon arc process on aluminum.

The metal arc welding of aluminum differs very little from the metal arc welding of steel except that it is faster (nearly three times) and presents little or no reason for weaving the electrodes. One essential difference, however, is the manner in which the arc is struck. Since the electrode melts very rapidly in the arc and solidifies with equal rapidity when extinguished. Sticking can only be avoided when the arc is struck by brushing the electrode over the surface of the base metal, like striking a match. Attempts to strike an arc by touching the electrode to the pieces to be welded will almost invariably result in sticking.

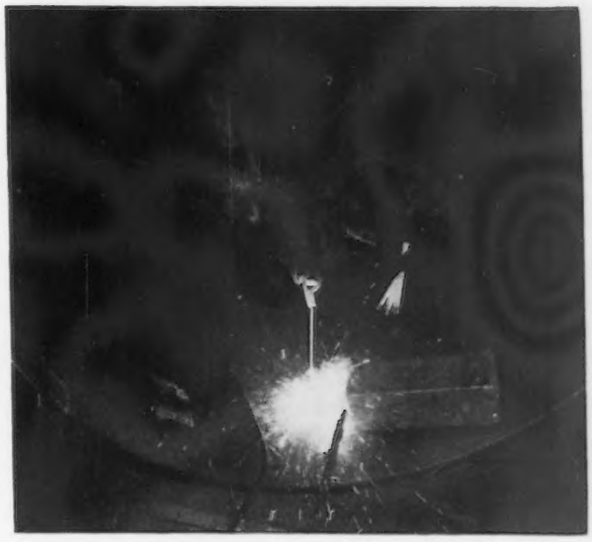
A short arc (⅛ to 3/16-in.) is the most desirable because of its stability. Since the electrode metal is consumed faster than the coating, a short arc often makes the coating appear to be in the weld crater. A long arc is apt to become wild and cause excessive spatter; it is also difficult to maintain.

When restarting the arc on a weld bead, it is best to start a short distance, ½-in., back of the crater of the preceding cleaned bead in order to avoid burning through the sheet.

There are a few difficulties encountered in metal arc welding. The electrode should be held in a nearly vertical position; 20 to 30° forward slant will, however, produce satisfactory results provided the electrode is pointed toward the completed bead. Should this forward slope be exceeded, a tendency towards excessive spatter and porosity develops.

FIG. 6—Manual arc welding of aluminum structural members for Republic Aircraft. Note the angle at which the electrode is held.

FIG. 8—Seams of all-aluminum tank cars are being tack welded before automatic carbon arc welding. Tacking is done by hand, using a 5 pct silicon aluminum shielded arc electrode, and intermittent welds about 5-in. long are spaced 5 in. apart.



The welding electrode is moved along the seam in a straight line at a uniform rate so that an even bead is deposited. The direction of movement may be either forward or backward, but it must always be the same, as back-step welding of aluminum is not satisfactory. A weaving or rotary motion should not be used in butt welding though these are recommended for fillet welding. A back-and forth rather than a weaving motion should be used for beveled joints.

Aluminum metal arc welds should be made in one pass wherever possible, but there are many instances, particularly on heavy plates, where multi-pass welding

is required. In these cases, it is necessary to make certain that each pass is thoroughly cleaned before the succeeding pass is deposited.

Practice is the primary need of the welding operator to overcome the few difficulties encountered in the metal arc welding of aluminum. One trouble, peculiar to the welding of aluminum, is the formation of a fused flux coating over the end of the electrode when the arc is interrupted. Because this fused flux tip is a perfect insulator, the welder will find it difficult to re-establish the arc. However, the annoying formation can be removed by hitting the end of the electrode against the work until the coating chips off.

The welding operator must remember that the correct current value and correct welding speed are of the utmost importance in the metal arc of aluminum. Too much or too little current will produce poor results. Welding too rapidly produces poor penetration, while welding too slowly will result in burning through the plate or the piling up of excessive weld metal.

Upon completion of metal arc welding, the weld deposit should be thoroughly cleaned of flux. Prior to the cleaning, the major portion of the flux should be removed by mechanical means, such as a rotary wire brush.

Carbon Arc Welding

The carbon arc is used extensively in the joining of aluminum pieces. It produces welds which are essentially the same in appearance, soundness and structure as those produced by either oxyacetylene or oxyhydrogen welding. At the same time, the welds may be made with considerably less distortion. Carbon-arc welding is done both manually and automatically.

Manual carbon arc welding is usually limited to thicknesses less than $\frac{3}{8}$-in. and is accomplished by the same method used for manual carbon arc welding of other materials. Joint preparation is similar to that used for gas welding except that it is not necessary to notch or to bevel pieces under $\frac{1}{8}$-in. thick. Backing strips similar to those recommended for metal arc applications will be found quite advantageous for carbon arc applications.

In carbon arc welding, the carbon electrode is ordinarily the negative pole. The filler metal, a flux-coated electrode, is fed into the arc flame in much the same manner as employed in gas welding. The heavily coated electrode used in metal arc welding may be utilized, for this purpose, but better weld appearance and faster welding speed will be obtained if a special carbon arc rod having a lighter coating is used. Current settings and electrode sizes for various stock thicknesses are about the same as those given for metal arc applications. As in all aluminum welding applications, it is essential that the deposited weld metal be thoroughly cleaned of flux and slag.

Automatic carbon arc welding is used extensively in applications where long butt seams are to be welded in heavy material. It is suitable, however, for most applications where production is in sufficiently large quantities to warrant the purchase of expensive automatic equipment. Standard automatic dc carbon arc equipment, in which a strong magnetic ac field is superimposed on the arc flame for control purposes, is used.

No edge preparation is required other than accurate fitting so that the edges meet along a uniform line. Clamps or metal arc tacking will be required to hold the edges in alignment. Backing strips are generally used. On the equipment described, the backing strip is usually a $\frac{1}{2}$-in by 2-in. copper bar having a center groove to provide space for a penetration bead and slag.

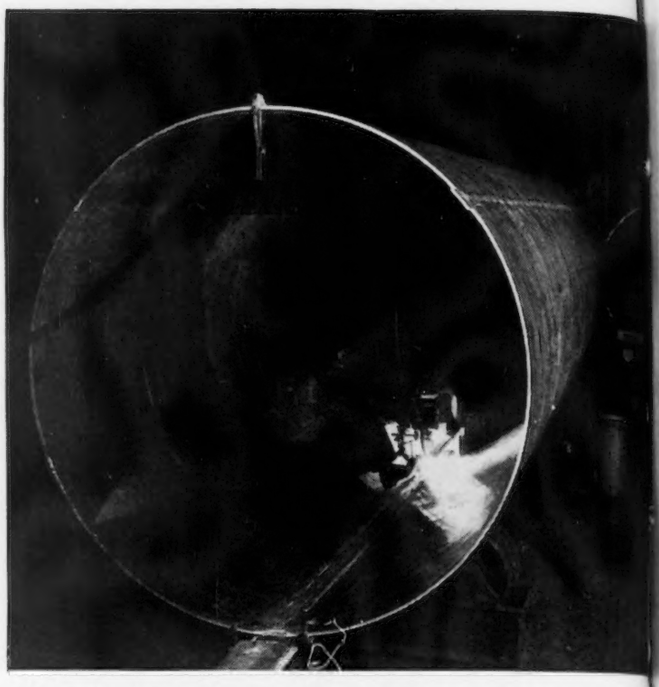


FIG. 9—Automatic carbon arc welding of all-aluminum tank car. Copper back-up bar 3-in. wide, $\frac{1}{2}$-in. thick, with $\frac{1}{2}$-in. groove is held against the outside of the joint. A tab is tacked to each end of the joint for starting the automatic arc bead.

A bare wire is used for the filler metal in automatic carbon arc welding. The welding wire used in gas welding is suitable for this purpose. Hard drawn wire will generally pass through the wire feeder of the welding equipment more satisfactorily than annealed wire. The flux in powdered form is fed into the weld automatically with the wire. Here, again, care must be exercised in removing the slag formed by the flux from the welds.

Atomic Hydrogen Arc Welding

Atomic-hydrogen welding, either manual or automatic, produces satisfactory results on aluminum alloys. In this welding process an ac arc is maintained between two tungsten electrodes in an atmosphere of hydrogen. Unlike other arc welding methods, the arc does not supply the heat used on the work. Instead, the heat generated in the arc is transferred to the work by the hydrogen. The process derives its name from the fact that the molecules of hydrogen separate into their component parts, atoms, as the gas passes through the arc from the jets or orifices around the tungsten electrodes. The gas in the atomic state is readily displaced with molecular hydrogen under a slight pressure and is edged out of the arc.

Without the intense heat of the arc, the hydrogen atoms recombine into the normal molecule and in doing this they give up their heat of dissociation. It is the latter heat that produces the resulting welding temperature. Thus, the weld is effected in an at-

mosphere of hydrogen, and oxidation of the molten metal cannot occur.

Procedure does not differ greatly from that used in gas welding, except that welding speed is usually much faster. In manual welding, the electrode holder is held in one hand, and the fluxed rod, like that used in gas welding, in the other. Except for flanged welds in aluminum sheet less than 1/16 inch in thickness, filler metal is usually required. Fillet welds always require filler metal to avoid undercutting.

The unusually high rate of heat transfer to the work results in high welding speeds, and consequently reduces distortion and the width of the heat-affected zone, as compared with gas welding. Low gas velocity at the nozzles prevents excessive blowing of the molten pool. Visibility of the molten pool is excellent. These two factors make it easy to produce welds of excellent contour and appearance. Since the hydrogen envelope surrounding the work serves to exclude oxygen, only small quantities of flux are required, and this is easily removed from the completed weld. The small amount of flux present during welding avoids blow-outs in the molten pool and makes it easy to obtain exceptionally sound deposited metal.

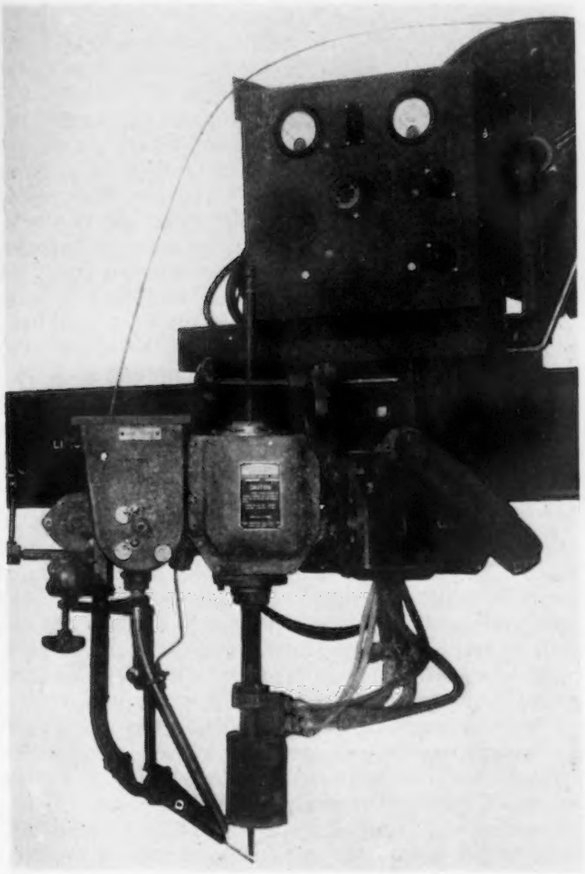


FIG. 10—Typical shop setup of a Lincoln automatic carbon arc welder as used for performing the operations shown in fig. 11.

For machine welding, automatic atomic hydrogen ac welding heads maintain a uniform arc size and position without constant attention by the operator, and permit extremely high rates of travel speed. When used with motor-driven filler wire feeders for adding filler at a uniform rate, welding speeds as high as 36 ipm can be obtained on butt joints in 3/16-in. stock, with complete fusion through the plate and excellent soundness, tensile strength, and appearance. Other thicknesses can be welded at correspondingly high speeds.

Current values used with atomic hydrogen arc welding are low as compared with other arc methods, on account of the relatively high arc voltage and wattage characteristic of the process. A value of 75 amp will permit welding at speeds up to 35 ipm on butt joints in ⅛-in. stock.

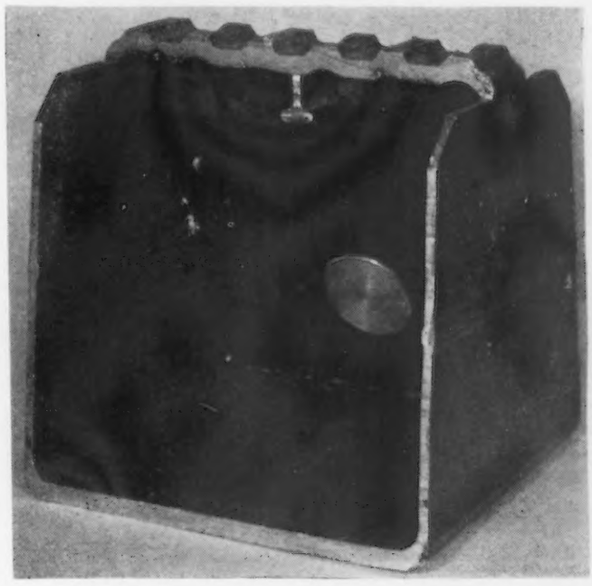
Inert Gas Shielded Arc Welding

Inert gas shielded arc welding is similar to the atomic hydrogen process. It employs a filler material, one tungsten electrode, and a gas to shield the molten weld metal from the air. Instead of hydrogen, however, an inert gas, helium or argon, is used. These gases do not dissociate as does hydrogen, so the heat-transfer characteristic of atomic hydrogen is not present. The arc is maintained between a single electrode and the base metal instead of between two tungsten electrodes as in atomic-hydrogen welding. Filler metal and weld puddle are shielded by the inert gas envelope so successfully that flux is not necessary when proper equipment and technique are employed. Slag entrapment is minimized and flux entrapment entirely eliminated when no flux is used.

Without flux, alternating current from specially stabilized power units is required; direct current can be used only if electrode is positive, work negative. However, the heat liberated at the work is low, and the electrode is overheated with this polarity. So all production welding without flux employs alternating current.

Argon gas is used for ac welding and it must be of very high purity (99.8 ratio of argon to nitrogen or better). Helium of available purities has not been successfully applied to the welding of aluminum with-

FIG. 11—Cutaway section of a balk for an aluminum bridge fabricated by automatic carbon arc welding. Structural members are extruded aluminum sections.



out flux. The electrode holder used must be of proper design to prevent air being drawn into the gas stream through leaks in the holder or hose connections.

Cleaning is important for consistent satisfactory welds in aluminum without flux. Avoid wire brushing. Manual or power abrasive cleaning is desirable, since it removes a part of the surface instead of scratching it as does wire brushing. For chemical cleaning, a sulfuric acid dip following the caustic etch is preferable to a nitric acid bath, because some nitrates are retained on the aluminum even with careful washing, and these interfere with welding. Sulfates are not so prevalent or harmful.

Current values used with a c welding of aluminum without flux are high: 450 to 500 amp are used in making butt joints (single pass, no beveling or spacing of plates) in 3/8-in. material; 100 amp might be used for corner welds in 1/16-in. stock.

Elimination of flux permits considerably more latitude in design than where flux is used, because some joints are practically certain to entrap flux with subsequent removal virtually impossible. Thus the a c argon shielded process allows the use of T, lap, and edge joints heretofore considered as impractical for fusion welding.

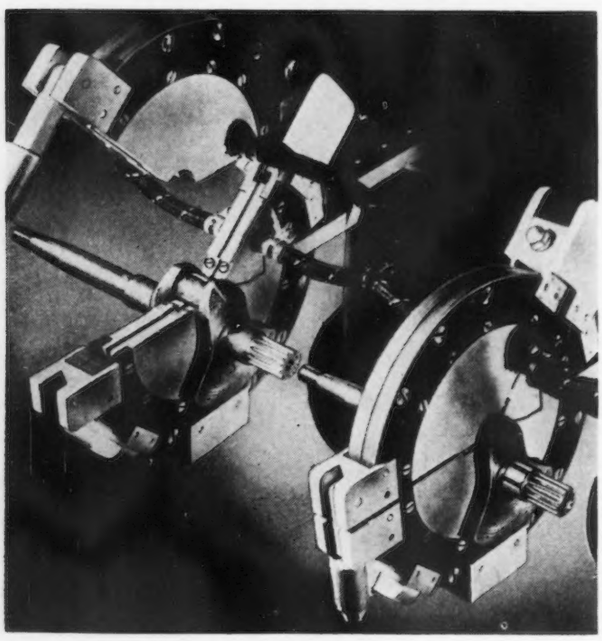
Where joint design and cleaning facilities permit the use of flux, argon or helium shielded arc welding with direct current gives excellent results with the same type of electrode holder as used for a c argon-shielded welding without flux. Either reverse or straight polarity may be used. Straight polarity (work positive, electrode negative) is preferable as it developes more heat in the work and less in the electrode, permitting higher welding speeds and use of a smaller electrode with consequently improved stability of the arc. Gas welding fluxes are used, in small quantities, so flux removal problems are minimized as compared with processes using large amounts of flux.

The use of d c with helium, while requiring the use of flux, permits machine welding with automatic heads to control arc length which can compensate for small irregularities in the height of the work by automatically withdrawing or extending the electrode to maintain proper arc length. This feature largely eliminates the necessity for extremely accurate preparation and clamping of the work, or close attention by the operator, or both. This is important in machine welding with a fixed electrode position.

Inert gas shielded arc welding was developed prior to 1930, but commercial application awaited the need for arc welding magnesium. Practical work with this material led to the development of methods and equipment applicable to aluminum alloys. It has proved to be of particular advantage in welding 52S. This process is characterized by relatively high speed (intermediate between atomic hydrogen and gas welding), good visibility and pool control, concentrated heat with consequent narrow heat affected zone, low distortion, extremely high quality and soundness of deposited metal, excellent bead contour, cleanliness, and, in the case of a c with argon, the elimination of flux. Tungsten electrode consumption is so low as to be negligible with straight polarity d c welding, or with properly stabilized a c welding with argon.

Multi-Turn Split Coil for Induction Heating

INDUCTION hardening of localized surfaces of such parts as crankshafts, camshafts, and similar components has been greatly simplified by the patented Thermonic multi-turn split coil developed by the Induction Heating Corp. Where the design of the part to be hardened prevents it from being placed within the conventional type of induction heating coil, as is the case with a crankshaft, a split-type coil must be used. Simple, single-turn split coils have been used for a considerable time. But where diameters are relatively small, say 1 in. or less, it is necessary to use coils of more than one turn in order to provide sufficient energy transfer to produce the results inherent to the induction heating process.



The new multi-turn split coil consists of two or more turns, made up of machined copper plates, which are split and hinged in such a manner as to allow the coil to be opened, the work inserted in place, and the coil closed and clamped, automatically making contact between the segmental sections to provide a continuous path for current flow. The segments of the coil are held in relationship to each other by an insulating retainer ring which runs around the outside of the coil proper and forms a closed passage between the coil turns.

When hardening operations are to be performed by use of the Thermonic multi-turn split coil, this chamber can be utilized to carry the quenching medium to the heated metal without removing the work from the coil. This also eliminates the time delay between the end of the heating process and the start of the quench, which is always present when the work must be removed from the coil prior to quenching. Thus, full advantage of the surface effect of high frequency induction heating can be obtained, since excessive thermal conduction into the heated part is prevented. And since both the coil segments and the supporting leads are independently water-cooled, the coil may be used without internal quenching, thus permitting continuous operation for all applications.

Simplifying Construction By Automatic Stud Welding

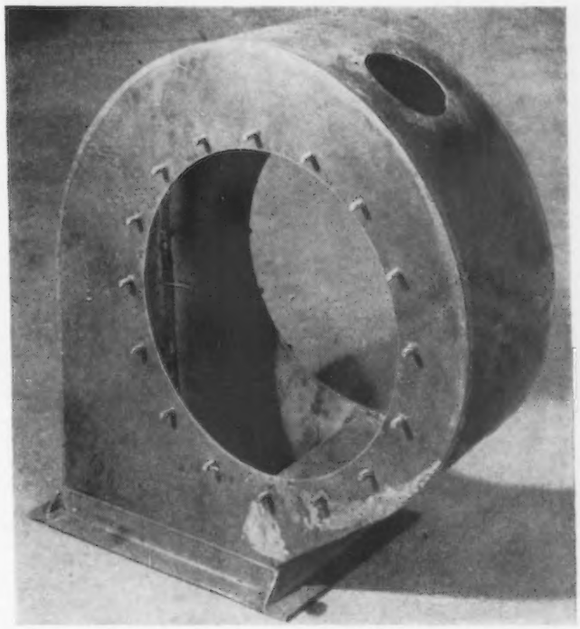


FIG. 1—A typical application of stud welding is soon on this blower housing.

Designed originally for welding studs to ship deck plates, stud welding is now finding wide application in many other manufacturing fields. The origin of the process, and its development to its present highly efficient state are described herein and information is given on the operation of the welding gun, and its use as a production tool in various manufacturing operations.

FOR possibly 25 yr, engineers have had the desire to end weld studs to steel plate. Especially in the shipbuilding industry it was realized that if wooden deck planks could be secured by end welded studs passing through the planks, it would be possible to save many hundreds of man hours over the existing method of drilling holes through the metal deck and inserting bolts from the underside. Moreover, it would be possible to obtain a steel deck plate that would be absolutely waterproof, with no danger of seepage. Many attempts to perform this operation were made in shipyards throughout the United States, but with very little success, and it remained for Ted Nelson, president, Nelson Specialty Welding Equipment Corp., to devise suitable equipment and techniques.

Approximately a year was spent in the development of an automatic control for the arc between the stud and the plate, and originally a bare stud was employed, using flux placed loose on the plate. It was found that by accurate control of the arc, fairly consistent welds could be obtained, but these were necessarily confined to downhand welding as the loose flux could not be held in all positions. Continued research, however, finally developed a special flux which could be inserted into a recess formed in the end of the stud, and made possible all-position welding. It was also found that a complete shield was necessary around the stud, so a ceramic ferrule was developed, which completely shields the arc and at the same time acts as a dam to hold the molten material in place.

The welding gun likewise underwent numerous changes from the original 35 lb unit to the present one weighing only 5 lb. The early model was not only heavy, but was quite tricky to operate. Continued improvements, however, simplified it to the point where it can be used without difficulty by inexperienced workers.

At first, the stud welder was used only for straight studs of various lengths from ¾ to 6 in., and ranging in diameter from ⅛ to ½ in., but later shoulder studs were developed in 7/16 and ½-in. sizes, with one end reduced to either ¼ or 5/16 in. to space brackets or hangers a given distance from bulkheads. Still later, eye bolts, J bolts, hooks, and special shapes such as cargo batten studs, metal lath studs, and lagging studs were developed, as well as a special rectangular type for attaching metal lath and wire. Insulation pins were also produced, whereby material such as Fiberglas could be literally nailed to surfaces by driving the sharp point through the material and welding the point to the metal base underneath.

The hand stud welding gun is a portable tool that can be moved with the ease of a conventional electrode holder. Standard welding cables are used to carry the current to the gun, and these may be up to several hundred feet long, which gives it a portability that no other means of end welding studs can do.

The amount of current required varies according to the size of stud being welded. A 300 amp machine will

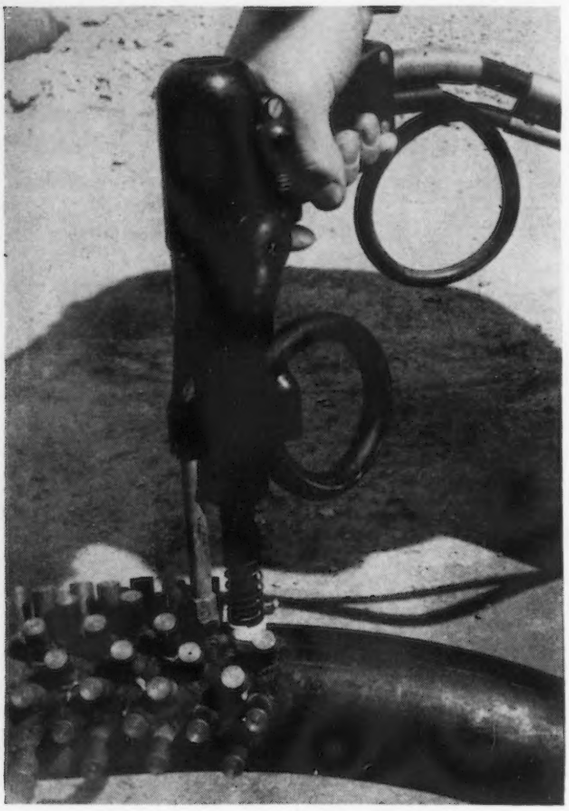


FIG. 2—Welding studs on a boiler tube with a Nelson manual stud welder is a fast and easy process.

weld studs up to and including 7/16-in. diam, while a 400 amp machine is needed for studs up to and including ½ in. For studs up to and including ⅝ in., two 400 amp machines must be connected in parallel, and for ¾-in. studs three 400 amp machines are required in parallel. The same gun is used in each case, and requires only the changing of the chuck to receive the particular size of stud being welded. The welding period is controlled by an automatic timing device which, once set, will automatically repeat the same weld cycle time after time.

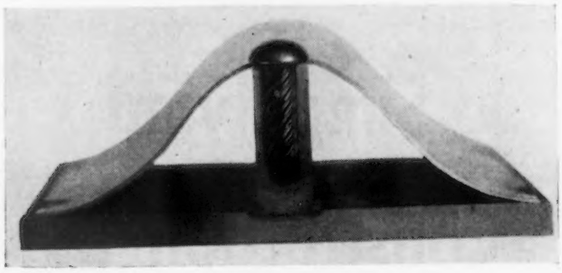


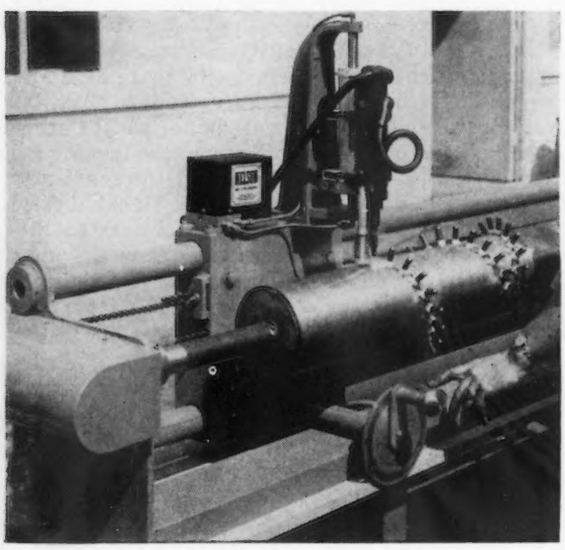
FIG. 3—For attaching corrugated roofing, a female stud is welded to the framework, and the roofing secured by self-tapping screws.

To make a weld the operator merely inserts a stud in the chuck of the gun, presses it up against the plate, squeezes the trigger, and the weld is automatically made. The arcing period is controlled by a pneumatic timer built into the control box of the gun. The control box is light, small and easy to handle, and the entire control circuit is governed from the dc welding power obtained from the welding generator, no other power being needed for its operation. This feature makes it possible to take the equipment into the field where there is no ac available to work with. In the construction of buildings, for example, gas driven generator sets may be used very conveniently as power supply.

Although developed originally for shipbuilding work, stud welding is coming into increasing use in the general industrial field, and is finding applications in the automotive, railroad, boilermaking, building, and farm and industrial equipment industries. Some typical uses in these fields are illustrated in figs. 1 to 5. Substantial economies can be realized since a single operator with a portable hand gun can weld from 500 to 1000 studs in an 8-hr day.

Production requirements have demanded special

FIG. 4—In this single-gun setup, teeth are automatically welded to the picker roller of a cotton gin in an accurately spaced, reverse spiral pattern.



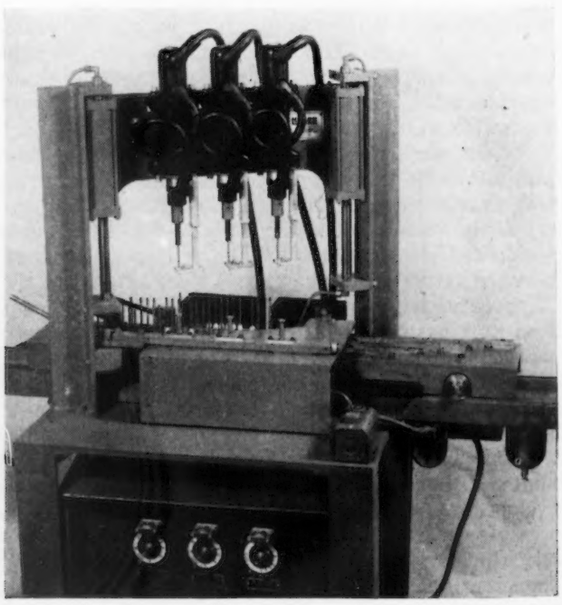


FIG. 5—A three-gun production stud welder with special jig for welding long studs on a telephone switchboard terminal rack.

equipment, and special high-speed units have been developed in which the guns are mounted permanently on an air cylinder that controls the welding cycle automatically by merely pressing a button. They are accurately built to hold very close tolerances, and many of them are capable of welding from 20 to 35 studs a min. They range from single gun units to eight gun units, and are designed to suit the particular job in hand.

Most studs are made from mild steel C-1012, but consistent welds can be had with stainless steel studs in type 302 and 304. Considerable experimental work has also been done with welding to aluminum, but this has not, thus far, been very successful. Research, however, is continuing, and it is believed that this will eventually be practicable.

Another process, known as plug welding, has also been developed, whereby two pieces of material can be plug welded together. This involves drilling a hole in the top plate, and then end welding a special stud to the lower plate through the hole, thus welding the two plates together. This is being done successfully with plates up to and including ⅛-in. thickness.

German Wartime Technical Developments

REPORTS of German practice in numerous technical fields of interest to engineers and executives in the metalworking field, issued recently by the Office of Publication Board, Washington, are briefly described below. These reports are in addition to the detail reports of German practice previously published in THE IRON AGE. Copies of the reports listed below may be obtained in either photostat or microfilm form, as indicated. When writing regarding these reports it is advisable to use the "PB" identification number listed.

Welding—Machines which can flashweld steel cross-sections up to about 38 sq in. have been developed and used by German technicians, according to a translation of a German book on the production technique and quality of flashwelder joints, published in 1936 by Dr. Hans Kilger, a German engineer. The translation was prepared in 1944 as part of a NDRC research project at Battelle Memorial Institute. The book is described by American experts to be "the most complete publication on flashwelding that has appeared in the literature to date." *PB-20181: Photostat $10; microfilm $2; 180 p.*

Fluoroscopy—Fluoroscopy was used for roughly 40 pct of the industrial X ray work done in Germany during the war according to a brief survey of the industrial X ray field in Germany made for the Joint Intelligence Objectives Agency by M. J. Gross. The report contains brief descriptions of major developments in X ray technology, fluoroscopy and end-grounded equipment. *PB-17551: Photostat, $1; microfilm, 50¢; 14 p.*

Refrigeration—German air conditioning and refrigeration industry was found to be 5 to 10 yr behind the American industry, according to a report by Gunner Berg for the Joint Intelligence Objectives Agency. The report briefly describes German refrigerators, refrigerants, compressors, condensers, evaporators, control valves, cabinets, cycling controls, and tubing, piping and fittings. Brief descriptions of 12 German firms visited by the author are included. *PB-17558: Photostat, $3; microfilm, 50¢; 35 p.*

Steelmaking—Development of processes for production of steels with low sulphur and phosphorus content during the war enabled Germany to save alloying metals and maintain mechanical specifications, according to a report by T. P. Colclough of the British Ministry of Supply. The report, which covers developments in the German iron and steel industry in the Ruhr and Salzgitter areas, was prepared for the Combined Intelligence Objectives Subcommittee. *PB-16720: Photostat, $10; microfilm, $1.50; 146 p.*

Compressors—Rotary gas compressors for medium pressures and large volumes, and reciprocating compressors for high pressure ranges up to 3500 atmospheres, were noteworthy wartime developments in the German gas compressor industry, according to a report by L. P. Jehle, investigator for the Joint Intelligence Objectives Agency. The report, surveying nine manufacturers in the industry, includes photographs, schematic diagrams and descriptions of these and other German reciprocating and rotary compressors and turbocompressors. *PB-12610: Photostat, $3; microfilm, 50¢; 40 p.*

Vacuum Melting—German processes for vacuum melting and pouring of metallic alloys prevent loss of beryllium alloys, result in hardenable alloys with reproducible properties, eliminate gases, and improve composition of alloys, according to a report by G. T. Motock, investigator for the Technical Industrial Intelligence Branch, Dept. of Commerce. Information on the processes used at the Heraeus Vacuumschmelze, Hanau, Germany, including copies of 10 captured German drawings of the general plant layout, various furnaces, melts, shops, rolling mills, and wire drawing units in the plant are covered in the report. *PB-15196: Photostat, $3; microfilm, 50¢; 39 p.*

Openhearth Design—Double slag pockets, a design feature of four openhearth furnaces in a German steel plant, are described in a report on German openhearth steelmaking practice made by British investigators for the Joint Intelligence Objectives Subcommittee. Brief data on furnace heating, practice, control and life are included in the report. *PB-4267: Photostat, $1; microfilm, 50¢ 11 p.*

Electronic Devices—Copies of 30 German patent applications covering telephonic and electronic devices invented in Germany since 1939 have been made available. The patent applications were made by the German firm Telefunken Gesellschaft fuer Drahtlose Telegraphie, Berlin. The text of the patent applications is in German. Each patent has an individual "PB" number. A list of the devices patented may be obtained from the Office of Publication Board, or from THE IRON AGE.

Magnesium Practice at I. G. Farben

DEVELOPMENTS in German magnesium production and fabrication are discussed in a recent report of the Combined Intelligence Objectives Subcommittee. The report, based largely on activity at the Bitterfield and Aken plants of I. G. Farben, stated that the total tonnage of magnesium produced in Germany was extracted by electrolytic processes, either the I. G. present process or the I. G. original process as used by Wintershalle at Herringen. Work was continued on thermal reduction with ferrosilicon and distillation, but the results obtained from the furnaces designed and built in 1938-39 to produce 2 tons each per day were unsatisfactory. No work was done on the direct production of high purity magnesium, and no magnesium cells were used for the production of anything other than magnesium. Major extensions planned were of the electrolytic type, one in Norway near Oslo of 12,000 tons capacity and one at Morrsbierbaun near Vienna with a similar output. The Norwegian plant was bombed on the very day it started and has not worked since; the Vienna plant was only in construction.

It was interesting to note that I. G. confirmed the conclusions reached by other allied sources that alloying with zirconium offers the greatest possibility of producing new magnesium alloys of improved characteristics and properties. The contents of some of the metallurgical reports indicate that I. G. had begun to realize the great importance of ultra-high purity materials to the development of alloys with improved characteristics and properties, and had decided to devote a considerable portion of their staff and energy to this work as soon as circumstances permitted. Briefly, it can be said that no new alloys were introduced by the Germans into practical production.

In the casting field, in an endeavor to improve further the purity of the AZG and AZF alloys and to raise the mechanical properties, I. G. introduced a new process for the reduction of iron content and hydrogen, called the "Elfinal" process, and is really a treatment of the molten material by anhydrous ferric chloride, $FeCl_3$. It is claimed by I.G. that this process avoids the need to superheat and is successful in almost eliminating hydrogen content in the melt.

The Germans had formed the opinion that the introduction of iron in the finely divided condition, which results from the decomposition of ferric chloride, is a substitute for the finely divided iron from the sides of the pots which is spread through the melt during superheating.

There would seem to be no doubt that hydrogen is very largely eliminated, and it is equally certain that a fine grain size is obtained, but whether the improved properties claimed are worth the extra cost involved, practical experience on a large scale alone would show.

There is a further difficulty in regard to this process insofar as that it can be highly dangerous. Ferric chloride is extremely hygroscopic, and as the amount required is roughly 0.5 pct of the weight of melt for ingot, 0.2 pct by weight for wrought, and it has to be plunged in a long container with a maximum of 200 g of $FeCl_3$ into the molten metal, if the material is not completely anhydrous a kind of explosion may occur which may easily result in fatal casualties.

I. G. does not believe that grain refinement can be brought about by mere stirring, though it does diminish the gas content of the metal. They suggest that superheating appears to be more efficacious in a new crucible than in an old one.

An interesting feature of German practice was the use of sulfur as an inhibitor in all the sand, not only facing sand. It is claimed that in a good foundry only 3.5 pct S is used in the sand, together with 0.01 pct boric acid. No glycol or any other binder is employed.

In the wrought field, the outstanding achievement was the production of forgings by the very large hydraulic presses of 30,000 and 15,000 tons respectively, of which blue prints have been taken by the various U. S. intelligence teams, and of which the tools have been removed by U. S. authorities.

A 30,000 ton hydraulic press was built to forge large sections of gun carriages for heavy German artillery to lighten the dead weight and improve mobility. The presses were then used largely for forging aircraft propellors in duralumin, the big press making two at a stroke.

Three methods are used for continuous casting of ingots for extrusion, rolling, etc. The first is a slight modification of the Junghans process. The main feature of the modification appears to be that the mold is considerably shortened compared with the original Junghans one. Presumably this means that less solid metal has to be drawn past the crucible walls. In the second method the metal is slowly drawn by an hydraulic ram out of the crucible in which it is solidifying and continually water-sprayed as it merges from the base of the crucible, corresponding to the direct casting method largely used in the U. S. and Great Britain. The third method is known as the water dip process, the use of which is highly recommended by I. G.

Improvements in the chromate process for inhibiting corrosion consist (1) in pre-treating materials (particularly pressure die castings) in caustic soda; (2) in adding to the chromate bath phosphoric acid and H_2So_4; (3) in adding chrome alum to the chromate bath. The addition of the chrome alum improves the color of the deposit and reduces the bichromate used to 1/10 or 1/20 of normal.

Electrolytic processes for protecting magnesium have also been developed. One bath consists of a 40 pct aqueous solution of ammonium fluoride plus ½ pct of ammonium phosphate. Direct current or ac may be used at 150v. The bath is kept at room temperature and the deposition is carried out for 5 min. An initial current of 6 to 8 amp per dcm^2 falls as the metal becomes coated. The pH of the bath should be 5 to 6 and if dc is used the metal being coated is made to anode. A white opaque coat, probably an oxychloride one 2 to 5 m in. thick is produced.

Both these films, though chemically resistant, are porous and should be lacquered or cellulose painted, the paint being thinned so that it penetrates the pores. The second coat is harder and less porous than the first one but it is very brittle.

New Equipment . . .

Plant Service

Interesting developments in plant equipment, including pipeline strainers, magnetic separators, flange-jacks, greasing and cleaning units are described in this week's issue. Liquid coolers, marking machines, and safety units are also among the devices announced by manufacturers.

A PRESSURE and suction pipeline strainer which maintains maximum liquid flow through piping systems while protecting pumps and moving parts of other vital equipment which might be injured by foreign particles, has been produced by *J. A. Zurn Mfg. Co.*, Erie, Pa. Maximum liquid flow is assured since the total area of the strainer basket perforations exceeds the area of the opening of the inlet by more than a 1.5 ratio. An air pressure relief valve on the

cover of the unit permits the escape of air that builds up within the unit, impeding the operation of the strainer and other pipeline mechanisms. The unit can also be furnished with a magnetized strainer basket for intercepting ferrous metal particles too small to be intercepted by the strainer. The units are available for either high or low pressures and made in cast bronze, steel, semisteel, iron or alloyed metals.

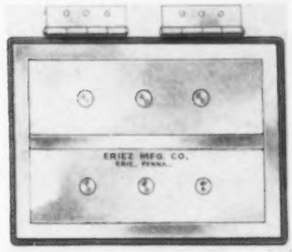
Pressure-Sealed Gasket

A SERRATED-TYPE gasket, known as Bellowseal, which uses the pressure to be sealed to exert a corresponding sealing pressure on the flange faces, has been designed by the *Goetze Gasket & Packing Co., Inc.*, New Brunswick, N. J. This gasket consists of two disks of metal machined on their external faces with standard serrations and welded together around their outer periphery. It combines

the pressure and corrosion resistant qualities of all metal gaskets with the light bolting requirements of a softer sealing medium. Line pressure entering the interior of the gasket exerts expansion pressure in excess of the required sealing force.

Magnetic Separator

DEVELOPMENT of a powerful, compact, nonelectric magnetic separator with a working surface made of stainless steel has been announced by *Eriez Mfg. Co.*, Erie, Pa. The magnet offers a simple means of removing both large and small pieces of iron and steel trash from ingredients going



into the manufacture of drugs, lime, cement, oils, coolants, paints, etc. Installed at any point where raw materials enter a chute or conveyor, the magnetic separator will attract and hold ferrous foreign bodies, preventing them from falling into pulverizing or reducing machinery. The magnet may also be installed in the bottom of a steel trough, pipeline, or liquid-feeding equipment, to remove ferrous particles from liquids and slurries, preventing material spoilage. Edge strips and center insulating strip of nonmagnetic stainless steel prevent the strength of the unit from magnetizing the steel on which it is mounted. The two pulling areas on each side of the center strip are made of magnetic stainless steel.

Air Separator

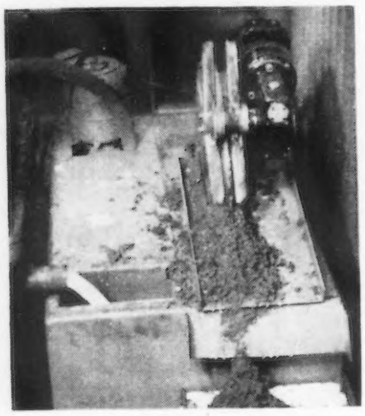
UNDER the trade name Airfuge, a separator for removing moisture, oil, scale, etc., from

compressed air has been announced by the *Swartwout Co.*, 18511 Euclid Ave., Cleveland 12. Utilizing the centrifugal principle characterizing steam and oil separators made by this company, this product features simplicity of construction and operation, and highly efficient separation. The air delivered by this device is claimed to be 99 pct or more free of contamination. Air entering the inlet is diverted positively to the inner wall of the round body and unwanted substances whirl out of the air stream and drain to the bottom. The cleaned air may be taken off horizontally or vertically

from pipe-tapped ports. An integral float-operated trap releases condensate automatically. The separator is made in three sizes for varying capacities and with a range of pipe connection sizes.

Oil Clarifier

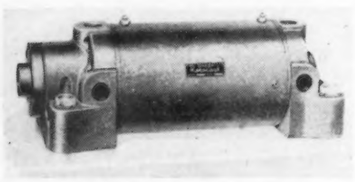
EQUIPPED with powerful permanent magnets which pick out the ferrous swarf removed from ground work contained in the



coolant from the grinding machine, as well as broken abrasive from the wheel, a device, known as the Clarifier, has been produced by *Arthur Scrivener, Ltd.*, Tyburn Rd., Birmingham, England. This cleaning device is automatic, making no demands upon the operator except the periodical removal of the sludge bucket. It is said to take little space and can be applied to any honing or grinding machine. Used coolant is fed through a restricted channel past a rotating aluminum disk which carries a series of magnets. These magnets collect the ferrous and grit particles, which are deposited in a separate discharge channel. The clean coolant is pumped back to the machine.

Hydraulic Cylinders

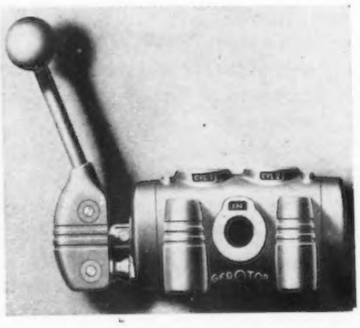
MAXIMUM power without leakage, and lasting accuracy of bore dimensions result from the



centrifugally-cast barrels and other features of the Rotocast hydraulic cylinders, which have been announced by the *Logansport Machine Co., Inc.*, Logansport, Ind. These cylinders are adapted for a wide range of operations involving pushing, clamping, lifting, forcing, pulling, pressing and other power movements. Conventional gaskets have been eliminated in the new Rotocast cylinders. In their place, soft synthetic O rings are used to provide a permanently leak-proof seal between cylinder barrel and end covers. These cylinders are offered in seven mounting types, three piston rod models and nine standard bores, and are available with cushioning at one or both ends if desired. Although designed primarily for oil service, these cylinders may be used for water service if the water is treated. They are built for operating pressures to 1500 psi.

Hydraulic Valves

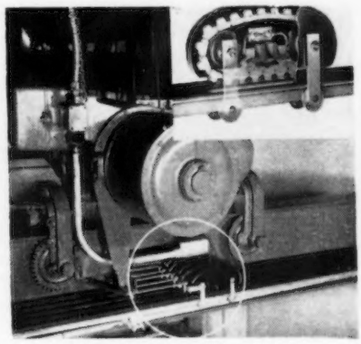
FOUR-WAY hydraulic valves, announced by *Gerotor May Corp.*, Logansport, Ind., have a floating piston design that permits close fitting of the piston in the valve bore and gives maximum sealing ability. The valve stem is supported in its bearings in the



valve covers without any influence on the piston fit in the valve body. These valves are suitable for oil service with pressure up to 1500 psi, and can be furnished for 2500 to 3000 psi oil service. For high pressure water service, valves can be supplied with noncorrosive materials. Four types of valve action are offered: standard, spring return, spring centered, and ball detent; five piston designs; six types of operation: hand, foot, cam, solenoid, oil pressure and air pressure operated. Sizes range from ¼ to 1½ in.

Rubber Insulated Trolley

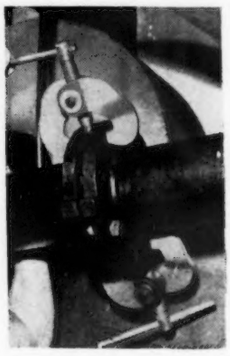
SUITABLE for electrically operated mobile equipment, such as cranes, monorails and portable tools, a rubber insulated TracTroly has been manufactured by the *Benbow Mfg. Co.*, Hobart Bldg., San Francisco 4, to meet safety code requirements which prohibit unguarded conductors. The system consists of a copper conductor in standard 10-ft lengths encased in a slotted rubber rack supported by a rigid backing; and individual traveling collectors which employ an



endless chain, like a tractor tread, to effect positive six-tooth multiple contact at all times.

Flange-Jacks

A TOOL, known as the Flange-Jack, which opens pipe flanges for gasket renewal, quickly, easily, and safely, has been announced by *T. G. Persson Co.*, 224 Glenwood Ave., Bloomfield N. J. With this tool pipe flanges may be opened or closed without damage to flange faces, it is claimed, and without danger from sparks. Danger to personnel from chips and flying wedges is also eliminated. Flange-jacks exert tremendous pressures

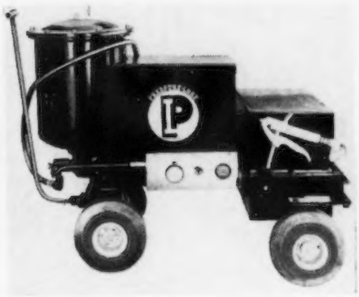


smoothly and evenly, eliminating vibration along the pipeline and the possibility of causing new leaks in nearby joints. They are capable of opening joints against a load of 15 tons without damage to the flanges. These tools are simple in design;

jaws are heavy one piece steel forgings; screw points are case hardened. Standard size Flange-Jacks open all 2 to 20-in. flanges and hold them in perfect alignment.

Portable Greasing Unit

TO meet any lubricating requirement, simplify the grease job and reduce maintenance costs, a portable greasing unit has been



developed by *Pressurelube, Inc.*, 609 West 134th St., New York 31. The equipment can be supplied with a grease gun for every purpose and is available either with battery-powered or gasoline-driven motor. The unit delivers up to 12,000 lb steady, consistent pressure, it is said, which is instantly available to clear the obstinate stoppages and effect complete lubrication of parts. Portability provides "on the spot" lubrication; trucks, trailers, tractors, rolling stock of all description may be serviced on the job without removing the load.

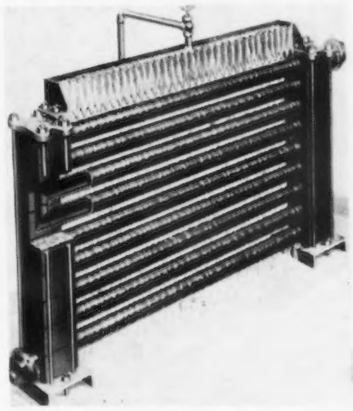
Cleaning Machine

AN electrically operated unit for handling all types and kinds of high pressure degreasing and cleaning has been developed by the *Drill Mfg. Co.*, 342 Circle Tower

Bldg., Indianapolis. The machine is said to develop 400-lb working pressure in less than 10 sec. Three units are provided in the one machine: A high pressure degreasing and cleaning machine, a built-in presoaking unit, and a high pressure car washer. The machine is portable, can be plugged into any standard light socket and used anywhere cleaning is accomplished with water. A cleaning compound and a noncaustic liquid solvent, Presoak, are available for use with this machine.

Sectional Cascade Cooler

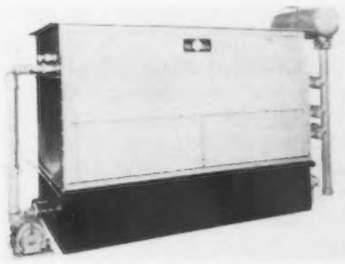
DESIGNED for the cooling of corrosive liquids and gases, Karbate sectional cascade coolers have been announced by *National Carbon Co., Inc.*, 30 East 42nd St., New York 17. A complete cooler assembly is quickly and easily erected from four standard items in five pipe sizes and is adaptable to a wide range of process requirements. Additional units or sections may be added. The coolers are recommended for service in acids, caustics, and organic solvents at pressures up to 75 psi and temperatures up to 338°F. Nine feet long, single pipe, Karbate cooler



sections are stacked to form a series flow vertical bank and are held in place by steel tie rod assemblies. Maximum external surface areas of 120 sq ft are available in all of the five sizes in the maximum cooler height of 6 ft.

Liquid Cooler

TO furnish refrigerated cooling water or any aqueous solution for industrial uses, the *Niagara Blower Co.*, 6 East 45th St., New York 17, has designed an industrial liquid cooler especially for air conditioning or water cooling jackets. The method used is to spray the cooling water over banks of coils in which the refrigerant is expanded. The water falls into a tank and is recirculated independently of the distributing system, thereby gaining the closest control over temperatures and efficiency in heat transfer. It is possible to produce 33° water constantly, it is claimed, without danger of damage from



freezing. The range of capacities in different sizes runs from 4.7 to 137 tons refrigeration. The 137-ton model is 105 in. long x 88 in. high x 60 in. wide.

Waste Receptacles

A COMPLETE line of Bennett Bilt waste receptacles has been announced by the *Bennett Mfg. Co., Inc.*, Alden, N. Y. These receptacles are fabricated from heavy gage steel and reinforced by rounded corners. All welded construction provides smooth, unobstructed, exterior surface. Two independently hinged doors permit them both to be opened simultaneously, and heavy tension springs keep them permanently closed when not in use. Four sturdy legs keep the bottom off damp floors.

Miniature Ball Bearings

SUPER light miniature ball bearings, available with OD of 5/16 in. and bores of 7/32, 3/16, 5/32 and 1/8 in. have been produced by *Miniature Precision Bearings*, Keene, N. H. The bearings are manufactured of chrome bearing steel and finished to precision tolerances of +0.0000 and −0.0002. Designed for use in small motors, computers, electronic equipment, testing and laboratory equipment, the bearings are said to accept unusually heavy loads and high speeds for their size and weight.

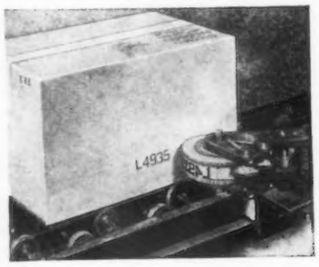
Precision Marking Machine

A HIGH speed precision marking machine with dial feed, known as Noblewest Model G232, has been built by the *Noble & Westbrook Mfg. Co.*, Westbrook St., East Hartford 8, Conn. The machine is used for production marking on the flat surface of small parts, the inscription consisting of one or more lines of characters which are impressed permanently into the parts. This model can be arranged for marking on steel or other metal parts as well as molded plastic parts. The dial has vertical adjustment for positioning up and down, and a lateral movement for sideway adjustment so that the inscription can be placed on the work in the location desired. A V belt drive to the motor which is mounted in the base of the column provides

for variation of speed. Work parts can be marked as fast as they can be loaded into the stations, this varying from about 25 to 50 per min.

Code Dating Attachment

TO mark cases, drums or kegs automatically, the Rolacoder No. 100, a rotary code dating attachment for conveyors, compression or sealing units, has been announced by *Adolph Gottscho, Inc.*, 190 Duane St., New York 13. This attachment will mark cases with an imprint on the side of a case and on a keg or drum with an impression on the lateral surface. The impressions may consist of numbers or letters on one line in a permanent ink. Type sizes are ¾ in.



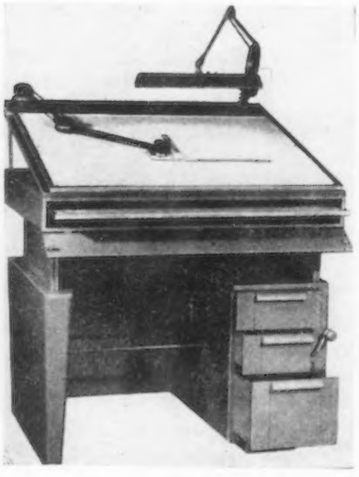
The complete unit is supported on a bracket for easy mounting.

Protective Hood

DESIGNED to give full head and respiratory protection on operations involving toxic gases and fumes when accompanied by the hazard of splashes of acids, caustics and other harmful substances, a combination gas mask and splash hood has been announced by *Industrial Products Co.*, 2746 N. Fourth St., Philadelphia 33. It is made with a full-vision gas mask to which has been adapted a Neoprene synthetic rubber head covering, extending down over the shoulders, chest and back. Seams are vulcanized. The canister type mask is available for short period use; for longer periods it is made with hose for attaching to compressed air line.

Work Tables

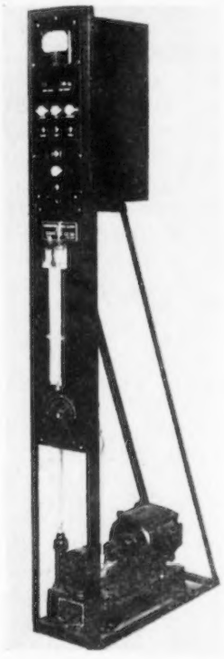
TWO all-adjustable Work-Flow tables, a drafting table and a tilt-top table, have been developed by the *Work Flow Equipment Co.*,



207 Wood St., Pittsburgh 21. Both tables are designed to provide the greatest possible utility and comfort for the table-top workman. The drafting table, illustrated here, can be adjusted in height and angle. Storage space is provided for three extra boards so that several working layouts may be kept intact at once and can be interchanged without inconvenience or loss of time. The height of the tilt-top work table may be adjusted from 28¼ to 38¼ in. for comfort of the operator in a sitting or standing position. The table top may be tilted from a level position to any angle up to 20°.

Gas Alarm System

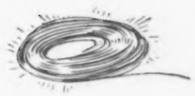
FOR detecting the presence of combustible vapor and/or gas, a combustible gas alarm system, which gives an audible signal before mixture with air becomes



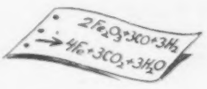
dangerous, has been designed by the *Davis Emergency Equipment Co., Inc.*, 45 Halleck St., Newark 4, N. J. The analyzer head is housed in an explosion-proof condulet and is located in the area being sampled. The control cabinet may be located at any distance in a gas-free area. The signal of any change in the gas and/or vapor concentration reaches the control cabinet through an electric cable, making the response instantaneous. This system can analyze combustible gases in any range from 0 to 100 pct. It visibly and audibly indicates the approach of such gases to dangerous limits.

WHEN

THE JOB IS BRIGHT ANNEALING LOW-CARBON WIRE

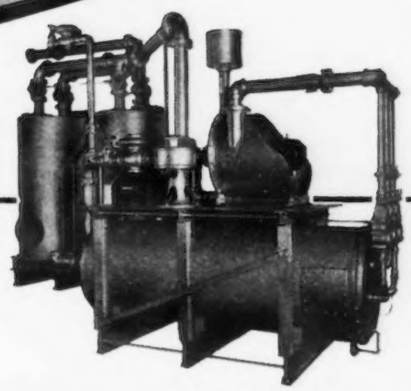


REDUCING VARIOUS METALLIC OXIDE POWDERS



TREATING SPRING STEEL IN DRY NON-DECARBURIZING GAS

THEN KEMP "atmos-gas" fits



AT ONE OF OHIO'S LARGEST STEEL MILLS

. . . this KEMP "atmos-gas" producer guards low-carbon steel from the effects of both oxygen and water vapor—throughout a full 72-hr. bright-annealing cycle. It supplies enough protective atmosphere (15,000 cu. ft. per hr.) to keep up with 15 or 20 sheet-annealing bases. Operating at 6:1 air-gas ratio, and equipped with generous silica gel desiccating towers (left rear), it produces the analysis: N_2—72%, CO_2—5.8%, H_2—12.1%, CO—9.8%, CH_4—0.2%, O_2—none—dried to a dew point of—40°F.

And the reason is clear-cut. KEMP "atmos-gas" units are designed to suit the particular requirements of the particular process.

For example, high-carbon steels are touchy. Too much CO_2 or too much water vapor may cause decarb or scaling during the annealing cycle. In such cases, KEMP "atmos-gas" units incorporate amine scrubbers for CO_2 absorption, and silica-gel towers to desiccate the output.

For treating copper and brass, "atmos-gas" in the low CO range is preferred. The reduction of metallic powders requires quite the opposite.

Where fuel-gas might be "sour", copper gauze strips sulfur from the atmosphere gas.

It all depends on *your* products and *your* processes. KEMP engineers can tell you where you stand in the confusion of claim and counterclaim in this fast-developing business of atmosphere heat treating.

KEMP OF BALTIMORE

PRECISION CARBURETION + ADAPTED COMBUSTION FOR INDUSTRY'S HEAT-USING PROCESSES
ATMOSPHERE GENERATION & ADSORPTIVE DRYER SYSTEMS FOR PROCESS CONTROL AND PROTECTION

JMLco K-G11a

The C. M. Kemp Mfg. Co.
405 E. Oliver Street, Baltimore 2, Md.

Put me on your mailing list for that new engineering literature you are working up. . . . . ☐
I'll write and state my problem, so that you can talk my specific case when you reply. . . . . ☐
Send your nearest field-engineer to see me. . . . . ☐

NAME_____
POSITION_____
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PLACE_____

Assembly Line . . .

WALTER G. PATTON

• Widespread utilization of nuclear energy seen . . . Briggs converts at cost of $9,500,000 . . . 60-ton tanks being built here.

DETROIT—The American Society of Mechanical Engineers convened in Detroit this week to hear the latest technical papers prepared by its members, visit industrial plants, discuss mutual engineering problems and indulge in such extra-curricular activities as would be proper for an engineer or physicist enjoying a well-earned change of scene. As might be expected, the atom got top billing and easily held the attention of the delegates who are naturally well aware of the changes the engineering world is undergoing as a result of recent discoveries in the field of nuclear energy.

The power of the atom having been convincingly demonstrated even before Bikini, much of the discussion centered around man's ability to harness the energy available through atomic fission and to utilize this power within the economic framework in which it must compete if nuclear energy is to be employed for peacetime industry.

According to Rear Adm. H. G. Bowen, Chief of the Navy's Office of Research and Invention, widespread utilization of nuclear energy is not only inevitable, but a primary objective of governmental research agencies. While Admiral Bowen does not feel that atomic power will be available for private automobiles, trucks or aircraft until a way is found to reduce the weight of the atomic pile (now said to weigh at least 100 tons), it was revealed that the U. S. Navy is eagerly looking toward a development of nuclear power plants for ships, submarines and nuclear munitions.

"There will be no miraculous transformation of energy into power" he said. "The heat from atomic fission will be used to make steam, and steam will drive turbines or reciprocating engines just as it does now."

An interesting picture of a nuclear electric power plant was offered by A. L. Baker of Kellex Corp., and still associated with the Manhattan project who revealed that the first atomic pile for industrial use has already been created and is to be harnessed to an electric power generating source.

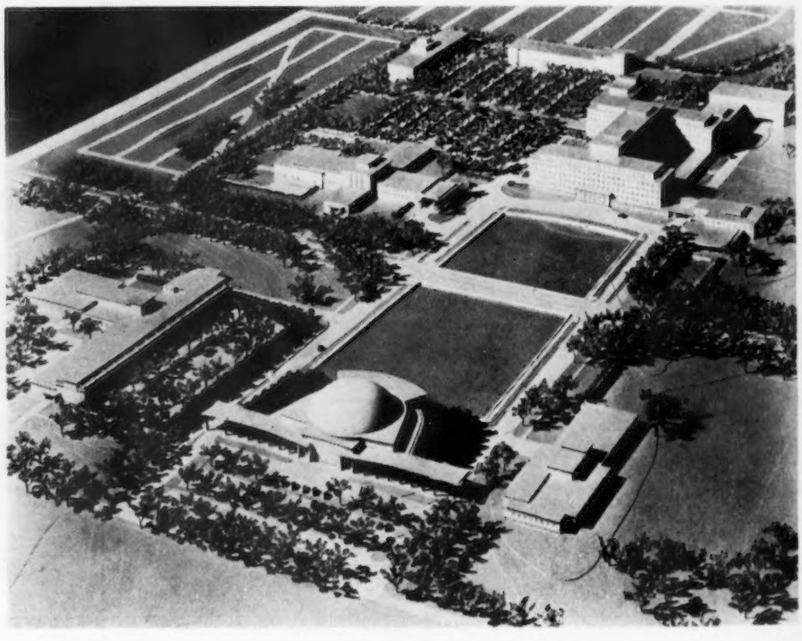
"The initial plants will utilize steam or gas turbines as prime movers," he said. "We no longer require the coal pile, coal handling or preparation equipment. Transport of fuel is virtually eliminated. Oxygen for combustion is not required. We can, therefore, eliminate the forced and induced draft fans, breechings, dust collectors and stacks. We have eliminated for all practical purposes the boiler room as we now know it.

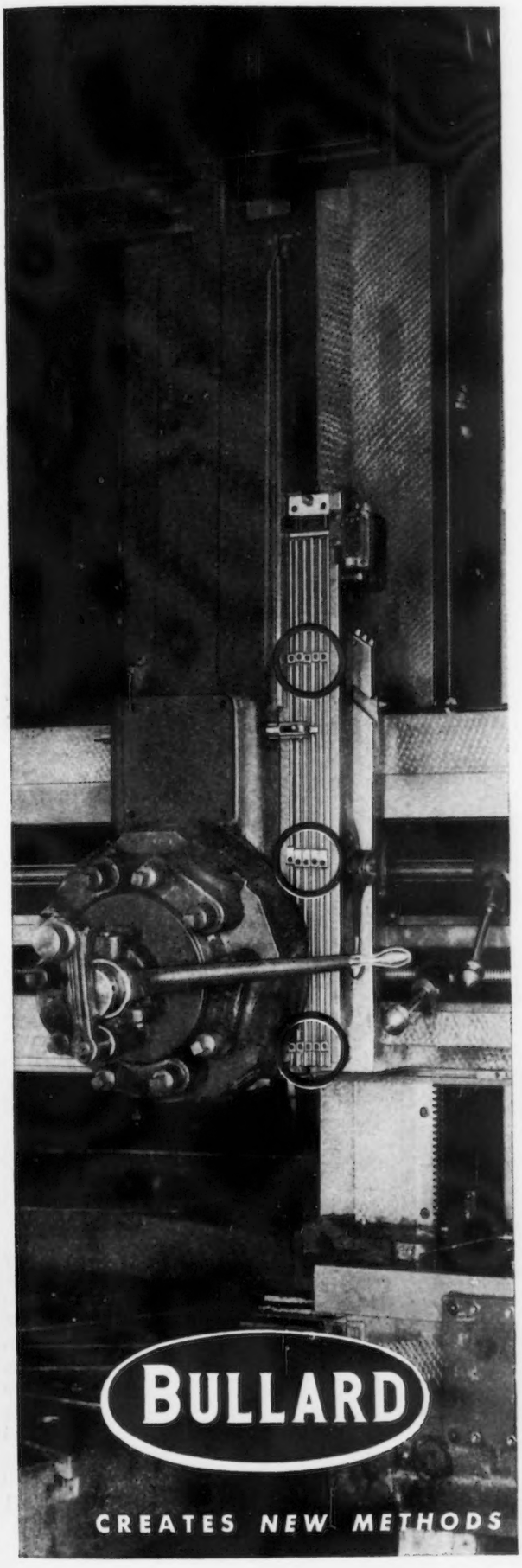
"In its place," the speaker added, "a nuclear energy generator system will be substituted, consisting of a nuclear energy generator and its component parts, including fluids for transfer of heat, heat exchanger equipment, etc., all combined as an integral closed system.

"Engineering materials of construction in use today are largely suitable and can be used in initial nuclear energy generator process systems. However, future progress to develop the full possibilities of nuclear energy will necessitate a large expenditure of time and effort in the development of materials for high temperature *and radiation stability*, shielding and heat transfer. This phase of the program opens up an entirely new and fertile field of research for the nuclear metallurgist as well as the nuclear physicist and the nuclear chemist," he asserted.

The speaker made a strong plea

BIRTHPLACE OF FUTURE FORDS: *Here is the* $50 *million research and engineering center to be built by Ford Motor Co. at Dearborn. The project which will take* 8 *yr to complete will be dedicated to Henry Ford, founder and the late Edsel B. Ford.*



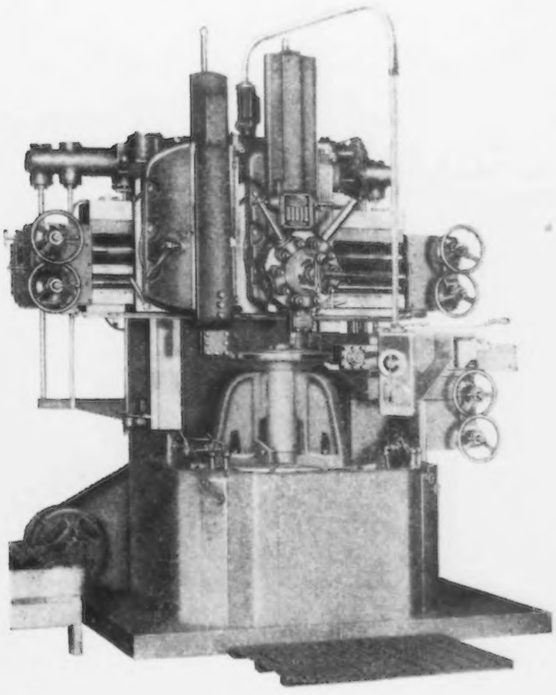


HOW BULLARD CUT MASTERS DUPLICATE DIMENSIONS SAFELY AND CONSISTENTLY

Bullard's skill in applying electrical-hydraulic control systems to machine tools...as exemplified by the Cut Master Vertical Turret Lathe's revolutionary new Pendant Control . . . is further illustrated by Bullard's method of dimension control through electrical and hydraulic feed stops.

On the saddle of each head of the Cut Master V. T. L., Bullard puts accurate adjustable dogs which are set to dimension limits for work size. When contacted by the moving head, they start a train of mechanical, electrical and hydraulic actions that disengage feed... instantly and accurately, thereby providing automatic sizing of work.

Such an automatic control system not only means that dimensions are easily duplicated but also that no head of a Bullard Cut Master Vertical Turret Lathe ever over-runs the cut or bumps any other head. Other reasons why Cut Masters are the surest means of *cutting time* on and between cuts are covered in Bulletin CVTL-4-1-46. Write for it today. The Bullard Co., Bridgeport 2, Connecticut.



Bullard Cut Master Vertical Turret Lathes are available in 30" and 36" sizes with two heads... in 42", 54", 64" and 74" sizes with two or three heads.

CREATES *NEW* METHODS TO MAKE MACHINES DO MORE

DETROIT GOES BACK TO WORK: *Smoke fills the sky as the Auto City gets into gear following the shutdown caused by strikes. This photo was made at Ford's Rouge plant.*

o o o

for planning and organizing codes that will minimize the hazards involved in handling radioactive substances. The immediate development of such safety codes, he asserted, becomes a prime requisite on the part of the ASME.

TO revert from nuclear energy to more immediate problems, the job of converting from war production to normal business in highly mechanized plants such as those operated by Briggs Mfg. Co., requires what the English call "a bit of doing." Perhaps this is one reason why a recent report to Briggs' stockholders is of more than ordinary interest. In this report, many interesting facts about Briggs operations have been revealed for the first time, including orders on hand at VJ-Day, contracts cancelled, cost of plant retooling and replacement, anticipated size of Briggs' postwar labor force and considerable detail about the company's manufacturing and merchandizing plans.

Prior to the war, according to the report, Briggs owned and operated, for body and parts manufacturing and plumbing ware activities, six large plants of its own with a total floor space of 4,800,000 sq ft. For its postwar activities, Briggs will use the six large plants owned before the war plus a new 700,000-sq ft Conner Ave. plant built for air frame manufacture during the war and two other purchased plants having a total of 785,000 sq ft. The total floor space to be used for postwar work will exceed prewar facilities by more than 40 pct.

When the war ended, the report continues, Briggs was confronted with $277 million in government cancellations. On hand was $78 million dollars in materials and machines. Suppliers' claims involved $4 million and 12,500 individual suppliers. All the paper work in connection with these contracts and cancellations is now largely completed, it is reported.

Up to the present time, reconversion has cost Briggs approximately $9,500,000. More than 5900 machine tools, 15,000 portable tools and 30,000 pieces of furniture and fixtures had to be moved before all the floor space devoted to war work was cleared. Following this, more than 32 miles of conveyors had to be installed, and thousands of tools, ranging from 400-ton presses to 20-lb sewing machines were set up and made ready for production. For its automobile body work alone, Briggs now requires approximately 15 miles of body assembly lines and two miles of ovens and spray booths. All this equipment has been installed since the war ended. Refitting of the main press plant for auto bodies alone cost $1,500,000 in 1945 to recondition body jigs, dies and fixtures which were not used during the war.

THE Briggs plumbing division which started modestly in 1933 now occupies the 500,000-ft Hamtramck plant. The company has appointed 137 new wholesalers, bringing the total of principal outlets to 250.

Annual plant capacity of Briggs body and body parts plants has been increased from 453,642,648 lb in 1938 to an estimated 932,712,508 lb at the present time. Prior to the war the company delivered as much as 19,780,000 lb of plumbing ware in 1 yr. Briggs is now tooled and ready to deliver 31 million lb of bathtubs, sinks, basins and other equipment in a 12-month period.

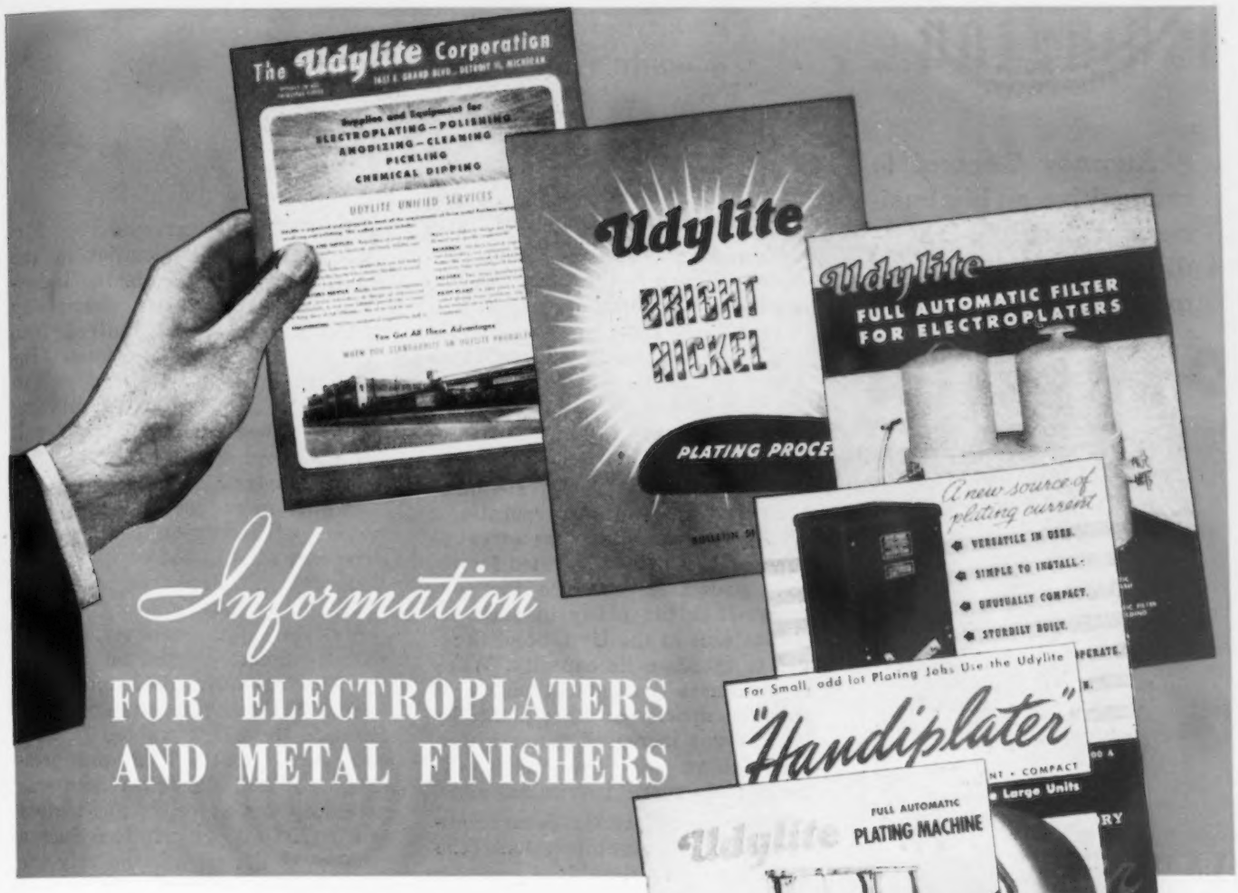
The fact that these plant potentials will not be reached for some time because of an inadequate flow of materials and parts does not detract from the usefulness of this information in evaluating potential postwar industrial capacity in the Detroit area. It is also interesting to note that postwar employment at Briggs is expected to hit 29,400 as compared with 22,400 employed during the prewar period.

IT seems that Detroit is not to be permanently separated from the business of making important sinews of war. A new tank weighing 60 tons is now being produced at the Detroit Arsenal, formerly the Chrysler Tank Arsenal, at the rate of 10 units per month. The big arsenal will be used permanently for the manufacture and repair of heavy tanks. At the present time, 1200 civilians are employed for peacetime production. During the war the Chrysler Tank Arsenal employed about 6000 workers.

Orders Double Output

Cleveland

• • • **Unfilled orders** of Dresser Industries, Inc., at the end of the second quarter of its fiscal year, totaled $40 500,000, double its output for the first half, and sufficient to continue all operations well into 1947 at full capacity, according to the company's quarterly letter to shareholders. The letter reported a net loss (without provision for tax carry-back) for the half year ending April 30, 1946, of $890,511 on a sales volume of $20,981,243.



Udylite has made an intensive study of electroplating and allied arts. The work of its Research and Development Division is a well-organized, full-time operation.

In the last 27 years Udylite engineers and electrochemists have encountered a wide range of problems and uncovered a vast amount of valuable information.

Udylite equipment has been built on this foundation. A few of the available descriptive bulletins are shown here.

If you would like to have any of these bulletins, tell us which ones. If none seems to bear on your individual problem, tell us what it is. Our engineers will have some information that may save you a lot of time and effort.

THE Udylite CORPORATION
1651 EAST GRAND BOULEVARD
DETROIT 11, MICHIGAN
REPRESENTATIVES IN ALL PRINCIPAL CITIES

Washington . . . L. W. MOFFETT

• Attorney General to make drive on big business with triple-D's — divestiture, divorcement and dissolution . . . Curtailed funds may hinder —won't stop push.

WASHINGTON — Turning from the old techniques of injunctions, criminal indictments and consent decrees, Attorney General Tom C. Clark wants to resort to the seldom-used processes of divestiture, divorcement and dissolution to crack down on "big business." The use of the three D's, he says, will establish complete and independent units of enterprise "which can and will in effect compete one with the other."

The Attorney General has set up premises, as have the Senate and House Small Business Committees, which picture "big business" as a frightful ogre that fattened itself during the war period and threatens to swallow the little fellow. A touch of irony is that many of these "giants" as the big companies are politically, repetitiously and monotonously described were expanded by war conditions with the government pushing the expansion. Some expansions were through building separate units. Others, as in steel, were in the nature of scrambled facilities.

It is not clear what Justice wants to do about the latter, which are government-owned additions to plants that already existed. It hardly can be conceived that they could be disposed of by WAA to other than their present operators. For outside interests to take them over and remove them would be impractical both financially and physically in the case of operations that are not only large and complicated but have become integrated with those of the entire plant. The practice has been for the present operators to purchase the added facilities.

Fault also lies in the sweeping premise that large corporations, whose production was as essential to victory as were the armed forces, have grown larger. On the contrary, it is the policy of such organizations as the U. S. Steel Corp. not to increase its capacity. When it purchases government plants, it reduces capacity at other plants by the amount increased through new acquisitions. So the indictment needs to be more discriminating.

Appearing before the Senate Subcommittee on Appropriations, the Attorney General said:

"A careful examination of the interlocking controls of industry convinces me that the evils which the anti-trust laws were designed to eliminate have been permitted to grow to gigantic proportions during the war. Competition, of necessity, during the war was virtually set aside. We are grateful to American industry for the magnificent job it did in meeting the requirements of war production. Nevertheless, the procedures, relationships and group actions developed between competitors during the war must not be carried into our peacetime reconversion. We must not permit an abuse of the new concentration of economic power in the hands of the few. Both actually and potentially the threat of abuse of industrial power is greater today than at any time in our history. This is exemplified by the difficulties encountered by the South and West in their efforts to achieve industrial maturity by keeping alive for peacetime production the vast industrial machine built up in those areas for war production. To thwart the development of struggling new industries would force the consumer to pay a noncompetitive price for the things he buys."

CONCERN expressed by Mr. Clark over difficulties of the South and West in achieving industrial maturity is not shared by students who have inquired into conditions in those sections. Instead, those sections are reported to be making big headway in building up diversified industries that will have no need to worry over northern or eastern strangleholds, nor will consumers need to fret over noncompetitive prices if the enterprises are allowed to function under their own initiative free of governmental interference.

Mr. Clark did not have any luck with the Senate Committee. It left the Antitrust Div. 1947 appropriation at $1,700,000 as passed by the House. Mr. Clark wanted $2,325,000, which was the 1942 appropriation. He said the latter sum was necessary for vigorous application of his triple-D prescription. Such a remedy, he declared, is the only one that will assure maintenance of free enterprise. Now that Mr. Clark did not get all the money he wanted, there may not be as forceful prosecution under the DDD program as had been contemplated. Nevertheless, it is doubted that it will lose much of its vigor.

The three D's means busting up of big business in one way or another. Put in a layman's language, they may be defined as follows:

Divestiture — Separation of one unit from another and different kind of unit. Example: Taking transportation from production.

Divorcement — Separation of branches of service with industry given a choice of which it wants to keep. Example: Pullman Co. chose manufacturing of cars and gave up their operation.

Dissolution—Breaking down the size of a corporation without necessarily changing the character of its operation. Example: Aluminum Co. of America.

The "good old days" of injunctions and criminal indictments are outmoded, said the Attorney General. He declared that as methods were devised to circumvent injunctions, the added use of criminal indictments acted for a time as a further deterrent. But today, Mr.

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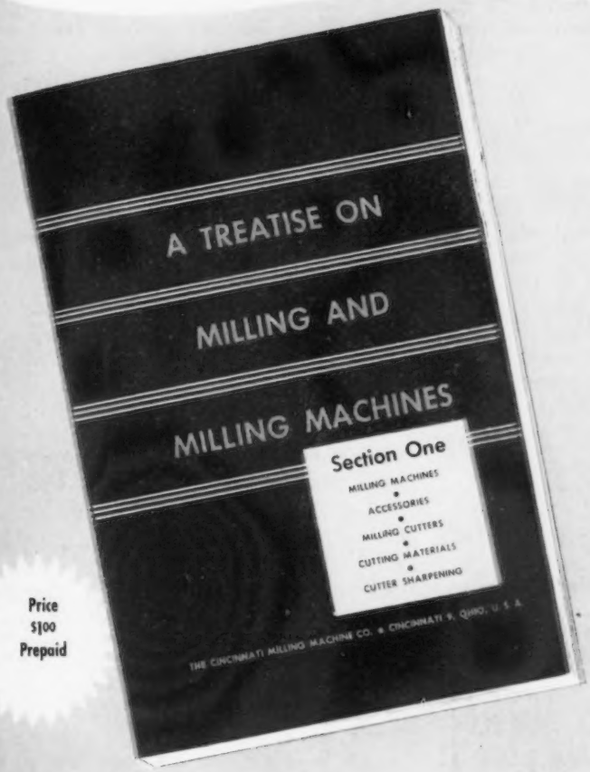

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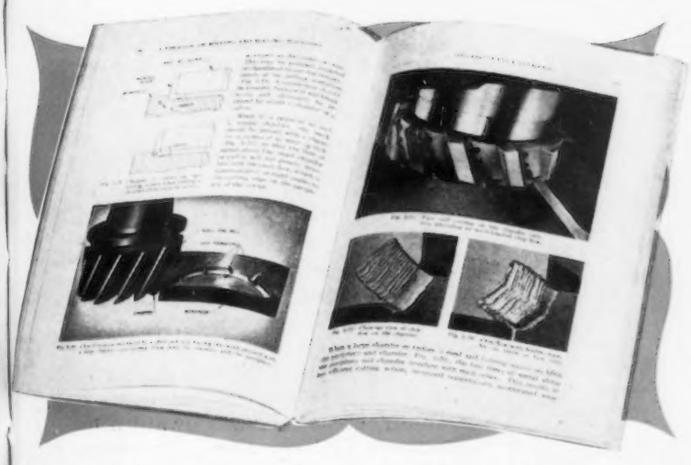

Typical pages of Section I of "Treatise on Milling and Milling Machines." This book contains definitions of milling machines and their accessories, and detailed data on cutters, cutter materials and cutter sharpening practice.

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Clark said, the payment of fines in a criminal suit is considered by many corporations as a part of the fixed expense of business. As for the consent decree, the Attorney General declared it has become a standard corporation form. He added that funds are not sufficient to enable the Department "to police the innumerable consent decrees entered into and thus they are, for the most part, ineffective."

The appropriation the Attorney General wanted is dwarfed by the demand of Sen. James E. Murray, Chairman of the Senate Small Business Committee. He has declared that "the Senate should insist that the appropriation for the Antitrust Div. be made equivalent to the cost of fighting the war one hour—just one hour! Such an appropriation would amount to $7 million. That indeed is a small price to pay for the prevention of collectivism and the maintenance of freedom and opportunity in our economic world."

This upping of the appropriation was suggested by the Senator in the course of a disquisition he issued on the basis of a report submitted to the Senate Small Business Committee by the Smaller War Plants Corp. The SWPC turned in its report shortly before its functions, such as they are, were transferred to RFC and the Dept. of Commerce. The report, consisting of 359 printed pages, has nothing new in it. It simply is a compilation from earlier studies, both private and government. It is designed to show the extent of economic concentration, with particular reference to the changes which took place during World War II. It does not make any recommendations. But Senator Murray, declaring that every industrialized nation which has become highly concentrated has succumbed to one form or another of collectivism, wants the Antitrust Div. to go into vigorous action at once.

* * *

PROPAGANDISTS within OPA are debating the advisability of utilizing a Bureau of Agricultural Economics survey of family savings to bolster arguments for continuation of price controls as a prop against general inflation. Covering some 3000 families in 35 states, the survey shows that half the families contacted account for less than 4 pct of total savings. OPA's argument would be that if prices rise, these families would be forced to spend their savings for necessities, leaving little or nothing for purchase of durable goods. This group, it is argued, must be protected from a booming sellers' market.

On the other hand, others contend that the survey lends itself equally as well to bolstering belief that only a brief flurry of price rises would result from complete decontrol, after which prices would settle to a normal level. It shows also that 60 pct of the total savings are concentrated within 10 pct of the families and 87 pct within 30 pct of the families. These are the groups now best supplied with durables, placing them in the best position to hold out against unwarranted price increases, as well as to force an early return of a buyers' market.

* * *

Buyers who hastily gobbled up some types of special purpose vehicles which accomplished wonders for the military are discovering that they are not nearly so miracle-performing when adapted to civilian purposes . . . A second headache for such buyers comes with the discovery that there is no substantial surplus of parts for repair and maintenance — and that none are being manufactured.

* * *

Although charged with rapid liquidation of government surpluses, WAA often must bow to rulings of other agencies. For instance, sales of all war plants for $1 million or more must be subjected to scrutiny of Justice Dept.'s antitrust experts who may delay as much as 60 days in rendering a decision . . . Another example is found in a recent order issued by CPA forbidding the agency to sell any brass, copper mill and certain other critical products except on certification of the buyer by CPA.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

Awards New Contracts

Washington

• • • **The Bureau of** Reclamation has awarded a contract to the American Bridge Co., Pittsburgh, for five 17.5 x 34.66-ft fixed wheel gates for the penstock structure of Davis Dam on the Colorado River near Kingman, Ariz. The delivered price is $169,305. For the same project, a contract was awarded to McKiernan-Terry Corp., Harrison, N. J., for five hydraulic gate hoists at a delivered cost of $138,026.

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Speed Production, Cut Costs

ON JOB LOT WORK TOO!

Here's how Oakland Machine Works*—an aggressive small shop doing diversified job-lot work, keeps tool costs low, makes fast changeovers, and meets close schedules:

1. They plan tooling to widely use low-cost, readily available "Standard" Carboloy Tools—adaptable to 60-80% of most jobs.
2. For "special" tooling—not adaptable from "standards"—they design and tip them with inexpensive "Standard" Carboloy *Blanks* from stock.

Whether your machining applications involve quantity production or job-lots, your plant, too can benefit by this low tool cost, wide adaptability, and ready availability made possible by Standard Carboloy Tools and Blanks. *Write for Catalog GT-175-R.*

1

1. EXTRA DIVIDENDS FROM "STANDARDS"

On **this** job-lot application—machining cast iron pulleys—"Standards" not only held down **initial** tool costs but also stepped up production; kept machines running 4 times longer per tool grind. For maximum savings, Standard Carboloy Tools were adapted to 8 roughing and finishing operations; while all "specials," except drill, were tipped with "Standard" Carboloy Blanks.

2

2. QUICK CHANGES AT MINIMUM COST

On job-lot work, set-ups change frequently! "Today" the job is a carbide-tipped 11-tool set-up for cast iron water pump housing parts. "Tomorrow" it may be an entirely different 27-tool set-up for one-piece aluminum fans and pulleys. By carefully planned use of adaptable "Standard" Carboloy Tools, Oakland keeps tool cost down despite frequent changes.

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When carbide tools went on this job—machining cast iron water pump housings—speeds jumped to 340 F.P.M.; tool life stepped up 600%. For extra economy, the 7 tools used were made with "Standard" Carboloy Blanks, available from stock at low cost.

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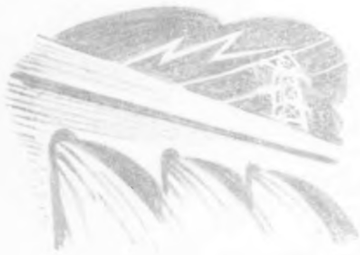
West Coast . . .

ROBERT T. REINHARDT

• Steel users eager for early capacity operation of Geneva . . . Black market in labor exists in area of plenty . . . WAA offers steel foundry for sale or lease.



SALT LAKE CITY—If all the heat generated by the controversy over who was to get Geneva could be directed into the blast furnaces and openhearths of the giant steel plant, the U. S. Steel Corp. would be producing at capacity already.

Now that the fires of contention have for once and all been quenched by the award of the plant to the corporation and only the legalities remain, steel and pig iron users of the West are asking how long they must wait for production. It is understood that the Geneva Steel Co., which resumed activity control of facilities on June 19 on an interim basis before turning the property over to Columbia Steel Co., is getting into production of pig iron, plates, structurals, slabs and billets as rapidly as furnaces can be heated.

While steel hungry fabricators aren't expecting miracles, they are already pressing for action at the huge plant. Especially hopeful are foundrymen and other pig users, who see in full operation of the three large blast furnaces, the relief for shortages which have become extremely acute in the past month.

While not committing himself on production plans, Walther Mathesius, president of Geneva Steel Co. did say:

"It is gratifying to know that the opinion rendered by the Attorney General has cleared the way and that accordingly, the acquisition of Geneva by the U. S. Steel Corp. can be regarded as an accomplished fact.

"On behalf of my associates at Geneva, I want to express sincere appreciation and gratitude to the officials, the businessmen, the press and our neighbors generally in Utah and the other western states, for their support to the Geneva Steel Co. in its war production task and to U. S. Steel Corp. in its proposal to acquire the Geneva facilities for peacetime operation.

"We look forward to working together with you toward the common objective of the greatest possible benefit to the industrial and economic growth of the West."

There is considerable conjecture as to whether Mr. Mathesius will continue to head the Geneva operation after Columbia takes over and the men who claim to be in the know are quite sure that there will be no change in top management. They reason that Mr. Mathesius has long lead a campaign within the corporation for larger western operations; that he has done an excellent job in building and running Geneva when the going was rough; and that much of the credit for the strong western support given to the U. S. Steel bid for the plant should go to him. Top management of all concerned has thus far not issued any statements on personnel.

IN spite of the last minute opposition of a group of small steel users in this area who favored CF&I's belated bid, the decision favoring the corporation has been generally approved. The views of the Steel Committee of the Western States Council were expressed by Kenneth T. Norris, chairman, and president of Norris Stamping & Mfg. Co., who said:

"Our committee, after representing the interests of western business in this matter since February, 1945, is gratified that the final action taken by the government in awarding the Geneva plant to the U. S. Steel Corp., closely follows our recommendations to government officials.

"Acquisition of the plant by the U. S. Steel Corp. is of particular significance to all western industry because the bid submitted by he company contained a statement of product pricing policy which includes the cost of production, plus a proper return to stockholders, plus transportation charges to western markets and does not reflect the so-called phantom freight that western industry has been paying on its steel."

Mr. Norris pointed out that the committee's investigations over a period of time indicate that production costs at Geneva are of such a nature that the plant can compete and become an integral part of the western steel industry. He indicated that while no immediate reduction in the differential paid by western steel buyers can be expected, the plants should form the basis for the new price policy for western steel.

PEACE in the copper mines seemed a certainty as settlement of the 5-month strike was reached by the full policy committee of District Two, CIO International Union of Mine, Mill & Smelter Workers and only ratification by the membership was required.

Major provisions of the agreement include: An 18½¢ hourly wage increase of which one-half will be retroactive to Sept. 1, 1945; standard maintenance of membership; and the new contract to cover a period of 2 yr but reopenable at the end of 1 yr on wages.

Robert C. Williams, special U. S. Dept. of Labor conciliator, urged that the membership ratify the agreement, saying:

"I heartily recommend this tentative settlement in its entirety to the striking locals for approval, since its terms are very liberal. Its acceptance, in my opinion, will not only prove to be a boon to workers involved, but to the companies, the community and the nation."

LOS ANGELES—Black markets in automobiles, household appliances, nails, wire, plumbing fixtures, lumber and other scarce commodities are understandable, but employers of skilled and common labor are perplexed when faced with the equivalent of a black market in workers.

While thousands of unemployed are drawing compensation, pirating

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● Flexibility and accuracy are required in building modern machine tools today. Here a Fosdick Hydraulic Radial is drilling and tapping 1290 pound base castings for the manufacturer of grinding machines.

This is only one of many jobs that find their way to this sturdy, well balanced radial. Not only is it easy to handle but has ample rigidity to maintain required tolerances.

The full hydraulic control by means of single hydraulic pump — centralization of controls—thirty-six spindle speeds—eighteen feeds and three pipe tap leads all contained in the head provide essential flexibility of operation and ease of control.

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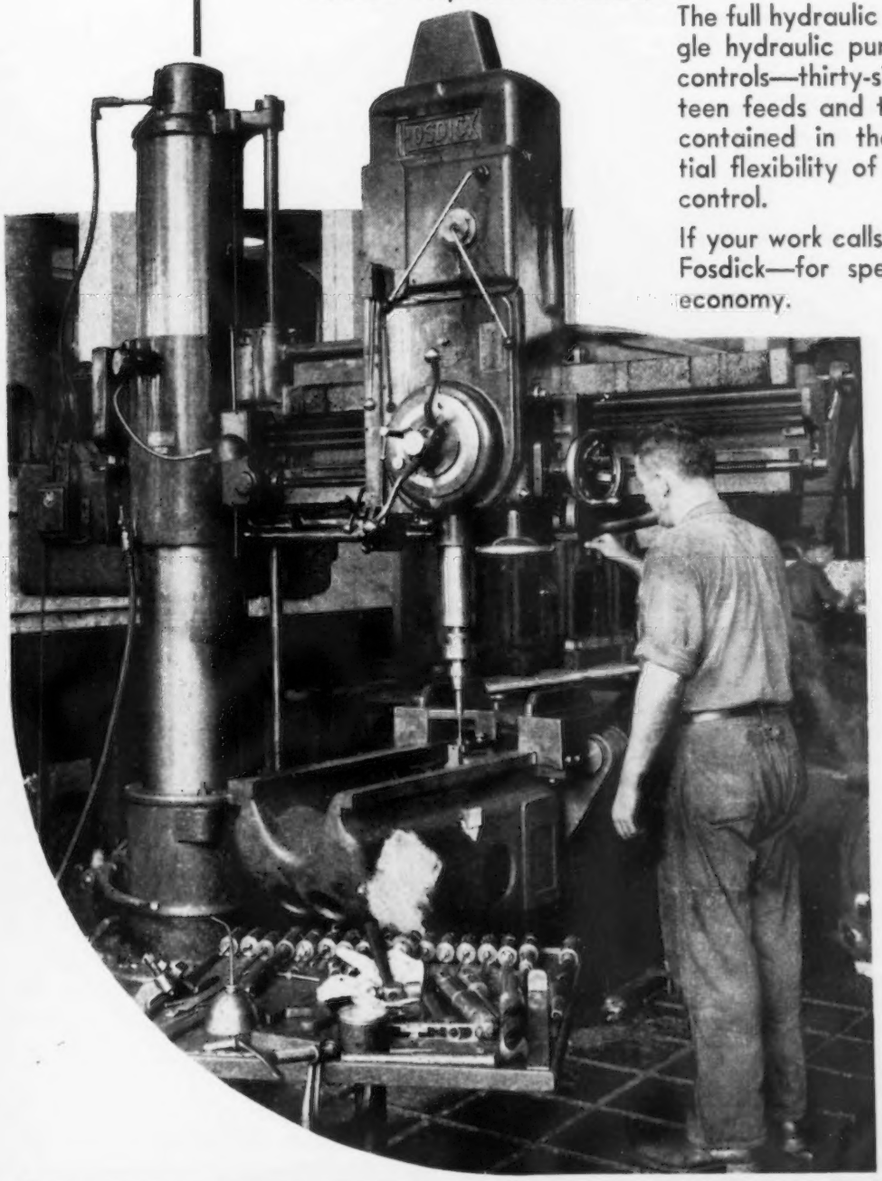

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of labor goes merrily on and the employers engaged in the practice give the excuse that there is no other way to keep going than to pay wages over and above the legal limit. The situation has become so serious in the electrical contracting field that the Regional Wage Stabilization Board there has sent out a warning to the effect that it intends to carry out spot checks and that law violators will be severely penalized.

Gordon J. Peterson, senior enforcement attorney for the board, said: "We have had reports of widespread pirating of employees and payment of illegal wages among electrical contractors in the Los Angeles area. In warning all contractors we are giving them an opportunity to clean their own houses first because we are more interested in compliance than penalties."

An explanation for the evident preference of the 100,000 or more who draw $20 a week unemployment insurance for this amount than for jobs, was given by a local industrialist who said: "We have a tough time getting the men we need. We can offer them jobs which will pay $35 to $45 a week, but they figure that by the time they pay transportation to and from work, buy their lunches, keep their work clothes in repair, spend some time traveling to and from the job and then have their take-home pay reduced by tax deductions, they are only a few dollars ahead."

How long this situation can continue is problematical, since by accepting a job for a short period of time an employee becomes eligible for another session on the unemployment insurance list.

Some industrialists class this labor shortage—or "labor reluctance"—as a higher hurdle in the path to normal operations than prevalent material shortages.

* * *

Utility Appliance Corp., local manufacturers of evaporative air coolers, fans, blowers and gas fired heating equipment, has purchased Gaffers & Sattler of this city and Occidental Stove Co. of Irvington.

The operations of the newly acquired companies will continue as in the past with Gaffers & Sattler manufacturing gas ranges as it has for the past 20 yr and Occidental continuing stove producion. This latter company was founded in San Francisco 75 yr ago and was purchased in 1938 by Gaffers & Sattler.

Ben. B. Breslow continues as president of Utility Appliance Corp. and Maurice Breslow as vice-president. George A. Sattler joins the board of directors which also includes H. A. Goldman, Bernard Harris, Leo Hungerford and Henry M. Bateman. Engineering and sales organizations remain unchanged. Total employment is now 750.

* * *

Harry Woodhead, president, Consolidated Vultee Aircraft Corp., has reported that his company received an order from the AAF for an unspecified number of P-81 long-range jet fighters. The P-81's, first plane to be powered by a gas turbine engine driving a propeller in the nose, and with a separate GE jet engine in the tail, will be built at the Vultee Field Div., Downey, Cal. The Downey plant is also engaged in building, tooling and assembling other Convair aircraft.

REMINISCENT OF WAR SHIPBUILDING: *Here are two of the largest merchant vessels ever built on the Pacific Coast. On these ways of Bethlehem-Alameda Shipyard, Inc., at Alameda, Cal., are, at the left, the* S. S. President Wilson *and at the right the* S. S. President Cleveland *which was launched last Sunday. These 22,900-ton ships are the last of ten P-2 troop transports built by this yard for the Navy. Complete conversion into luxury liners will put these ships into trans-Pacific trade.*

SAN FRANCISCO — The large steel casting foundry built by the Navy Dept. at a cost of $2 million in Oakland, Cal., and operated by General Metals Corp. during the war, is offered for sale or lease by War Assets Administration.

The plant has a reported capacity of 12,000 castings annually and consists of the main foundry 208 ft by 409 ft, one wing 65 ft by 185 ft, two pattern shops, an office, and X-ray building and a number of small buildings. The 19-acre tract of land on which these buildings are located is owned by General Metals Corp., but the government has an option to purchase it. Two spur tracks connect the property with the Southern Pacific R.R.

* * *

Approximately 7000 tons of steel went down to the sea last Sunday as Bethlehem-Alameda Shipyard, Inc., launched the S. S. President Cleveland — a 22,900-ton luxury liner which is reported as being the largest merchant vessel ever built on the Pacific Coast.

Plate used throughout the ship varied in weight from 8 to 50 lb per sq ft and shell plates were welded and seams riveted. An innovation in ship construction is the use of an aluminum deckhouse.

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"Q. C." — Quality Control — is no stranger to Armco mill representatives and production supervisors. Control charts and statistical analysis are developments of recent years; they help assure consistent production of prime Armco sheets.

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This means the salesman, mill representatives and metallurgists study your order and its requirements—determine for what purpose the steel will be used and how it will be fabricated. Then, on your individual routing card, metallurgists specify the mill routing that will give your sheet steels the properties they need.

In all these deliberations the Armco mill representative first keeps *your* problems in mind. He is your assurance of a high "Q. C." in the Armco special-purpose steels that go into your products. The American Rolling Mill Company, 3401 Curtis St., Middletown, O.

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European Letter . . .

JACK R. HIGHT

• Belgian social insurance plan is broadest yet . . . Deflation program pushed by Van Acker Government . . . Steel nationalization improbable.

BRUSSELS — Compared with the sights that I have seen in France, Germany and even in London, life in the capital of Belgium today is certainly much brighter. All kinds of consumer goods are more available, food is to be had on a scale unprecedented in most of the rest of Europe and industrial vigor is apparent everywhere.

Certainly the most basic difficulty in life in Brussels today is the high scale of prices both in the legal market and in the highly organized black market where a large proportion of Belgians obtain part of their commodities. The activity of the (near Labor) government in this direction is forthright and admirable, and shows a willingness to face bitter facts that might well be copied elsewhere.

The Belgian labor unions consider Premier Van Acker to be their man, and pressure on him by the unions for general price increases has been tremendous, but he has refused to proceed with such increases and thereby boost the spiral of inflation that is already damaging the Belgian economy. Instead, he has directed a drastic price cutting program which, while it is a bitter pill for many to swallow, has been accepted in full confidence by the Belgian people as necessary. The first step was a recent 10 pct cut on all prices for goods sold to their ultimate consumers, and although this makes but a small dent in the sky high levels, it is a step in the right direction.

This general decrease is not borne by basic producers, but is rather intended to reduce the broad margins of profit that have been enjoyed since the beginning of the war in Belgium by the middlemen in almost every transaction. The general distribution of this decrease in the steel industry is about as follows:

The steel plant, which in Belgium is usually a separate company from the rolling mill, maintains its prices at the same level. The rolling mill as the first middleman reduced its prices by 4½ pct. The jobber cuts his margin by 1½ pct, and the firm selling the end product makes a further 4 pct reduction, making up the 10 pct cut.

A great growth in the profits taken by entrepreneurs between the producer and the ultimate consumer is one of the most serious problems in which the Belgian Government is interested. Being a small, compact country, the number of middlemen was indeed limited before the war. The existence of a large number of artisan families constituting extremely small production units which sold in many cases direct to the ultimate consumer also tended to reduce the amount of profits going to middlemen.

THE chief factors in multiplying their number during the war were first the German necessity to insert a new level at which control of both producer and consumer might be easily effected, and secondly the almost universal Belgian desire to be able to claim some form of occupation during the German control without doing any productive work.

As a result many thousands of Belgians set themselves up in buying and selling, or at least they told the Germans that was their occupation (thus avoiding deportation as slave labor to German industry). While, of course, probably many more Belgians described themselves officially as "intermediares" than were actually gainfully employed, the official organization of the black market did use many thousands.

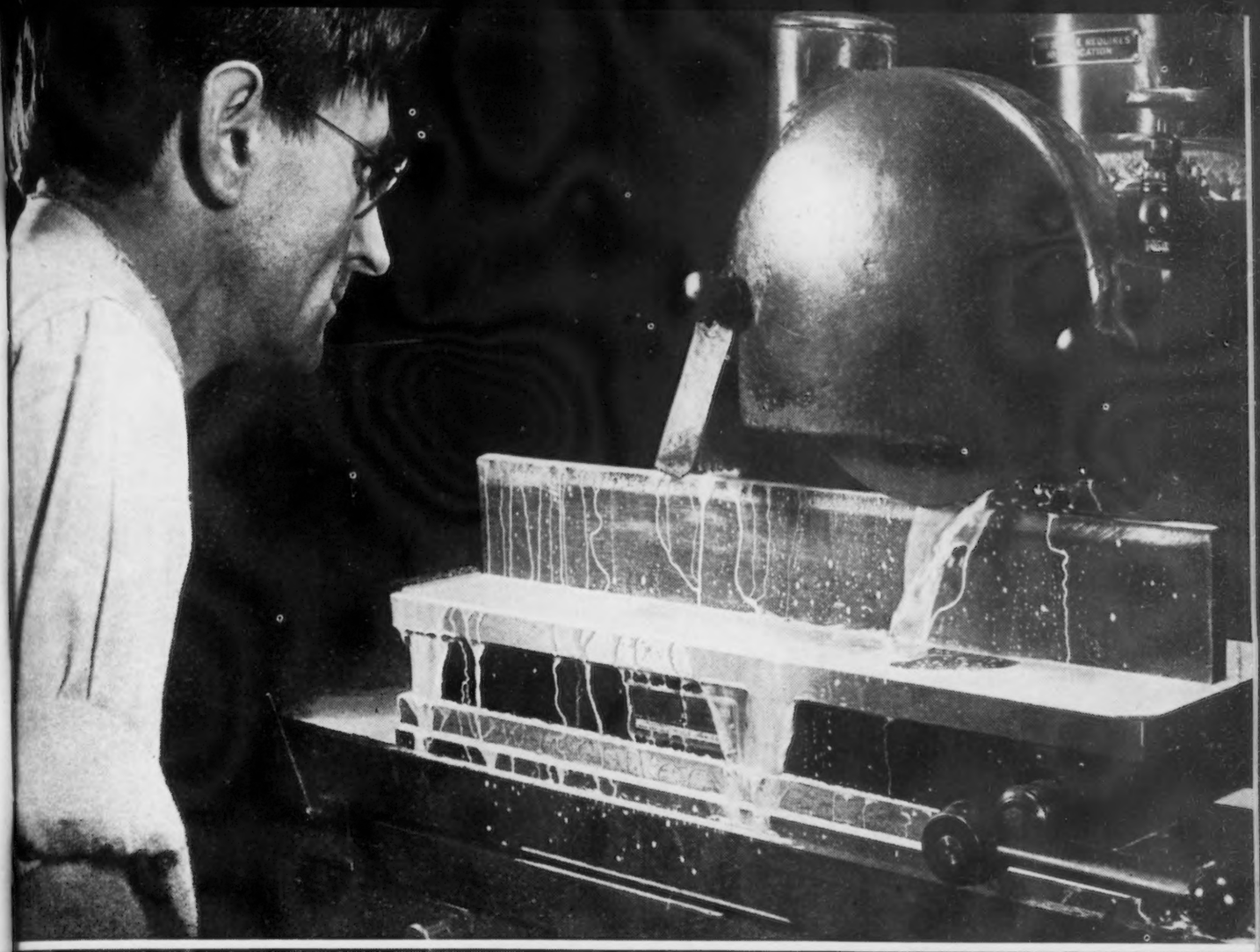
In the operation of this semi-official black market it was the middleman who went to the farm, bought the food, transported it to Brussels or Antwerp and sold it there, who took most of the risks, and consequently this middleman learned to ask for tremendous profits. Since the end of the war it has been as difficult to reduce those profit margins as it has been to stamp out the black market itself.

There is no denying that in the industrial sphere, within the limitations dictated by the coal shortage, Belgium has made a remarkable recovery. The history of the year and a half since the liberation of most of Belgium is one that any American would look upon today as having been remarkably free from political and labor difficulties. Although compared with France or the United Kingdom the Belgian Government is quite conservative, it is by American standards extremely liberal if not radical.

Although plans for nationalizing basic industries have been discussed, there is no indication at the moment that the present government intends to press such a program with any enthusiasm. There is a program in progress for the complete reorganization of Belgian coal mines along lines that, in a country committed to free enterprise would be considered impracticable, but by socialist standards it will not be public ownership in any sense.

THE coal fields in Belgium have been worked in many decades on the basis of very old concessions, most of which are small and were chartered on the basis of the meager knowledge available in the 1800's. The result has been that the modern workings are on an inefficient basis with the same vein often split between two or more firms and more than one shaft being used in the case of an arbitrary boundary line separating the holdings.

In some cases holdings by separate companies overlap each other because of the direction of some veins, so that it is generally agreed in Belgium that some kind of a



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The machines had been lubricated with sticky oils that made them gummy and hard to operate. Work didn't come up to specifications, had to be scrapped.

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broad rationalization program is essential, if coal production costs are to be kept down. The detailed program for this operation has not yet been passed by the government, but in its present form will probably reduce the number of coal companies from approximately 30 today to possibly as low as five organizations.

The shares, however, will remain in private hands although there will be a control board with advisory powers only composed of labor and management representatives and possibly also governmental representatives. Some Belgians feel that the governmental representation should be dominant, but this issue has yet to be decided.

As far as the steel industry is concerned there is no plan today for nationalization and most steel men seem undisturbed about the future possibilities. The government has appointed a re-equipment minister whose terms of reference include a general study of the need for modernization of the steel industry along with the rest of Belgian industry. It is apparent that this new department will base its studies on fundamental facts, as it has recently requested by mail a list of the common trade terms used in the steel industry so that it will at least know the language of the mill.

Belgian industrialists consider American labor disputes surprising and hold the viewpoint that the recognition of new labor prerogatives since the end of the war is inevitable. During the war years with much of the management and the workers conspiring under cover to deceive the Germans, the two groups were naturally driven closer together in an instinct of sheer self-preservation.

A broad social insurance program which outdoes even the Beveridge plan was drawn up in secret before the liberation and has now been in operation for more than a year. The impact of this program which calls for a contribution of 15 pct by employers and 5 pct by employees may, of course, alter the pattern of Belgian international trade. The insurance plan covers all contingencies of death, temporary incapacity, permanent disability, medical fees and pensions, and as such is one of the biggest plans in operation in Europe today.

British Export Group Prepares New Booklet

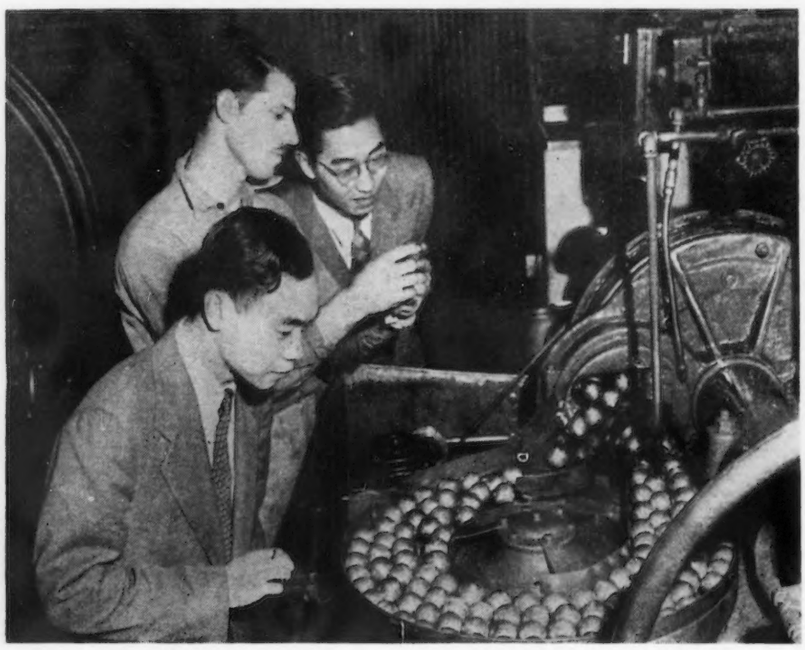
London

• • • **The Export Committee** of the British Engineers' Assn. has recently prepared a monograph on exports which affords a simple explanation of the economic background of export policies and provides a concise account of the technique and fundamentals of exporting practice.

Part I stresses the need of a great increase in exports for Britain to survive as a world power and maintain its standard of living, because it is only through exports that the country can secure adequate supplies of food and raw materials. Several sections are devoted to an examination of the effects of the war and of the American loan agreement.

Part II is addressed primarily to those engineering manufacturers who may not previously have had experience in export. They are advised to get acquainted with the special characteristics of the overseas market they intend to enter. It is emphasized that in the export drive a target of a 75 pct increase in volume over 1938 has been set by the government, and if this target is to be approached the export of machinery must play a very large part.

BEARINGS FOR THE MACHINES OF CHINA: *Chinese representatives inspect the ball bearing precision grinding technique used at SKF. The Chinese government men are familiarizing themselves with the methods employed in many of our key industries.*



Tighten Export Regulations

Washington

• • • **To prevent the use** of veterans as "fronts" for new export establishments, the Office of International Trade, Dept. of Commerce, has tightened regulations which give preference to veterans in obtaining licenses to export.

Exporters claiming preference must present evidence of status as veterans, and of the extent of ownership interest by veterans in the export enterprise. Normally a partnership or corporation will not be granted the preference unless there is a minimum of 50 pct ownership interest held by one or more veterans, OIT said.

Export allocations of most scarce commodities are made on the basis of an established exporter's prior participation in a given market. About 5 pct of the gross allocation of most goods is set aside for veterans who are entering the export business.

PERSONALS

C. E. CLARKE, general manager, Bethlehem Steel Co.'s Steelton plant, effective July 1.

• **C. E. Clarke** has been named general manager of Bethlehem Steel Co.'s plant at Steelton, Pa., effective July 1, succeeding **Frank A. Robbins, Jr.,** retired. Mr. Robbins has been in his present post since 1918, and started work at the Steelton plant 44 yr ago. Mr. Clarke has been assistant general manager at the company's Sparrows Point plant for the past 18 yr. **W. E. Grainger,** superintendent, coke ovens dept. at Sparrows Point plant, will succeed Mr. Clarke.

• **John F. Jones** has been appointed assistant superintendent of bolt, spike, grader blade and grinding ball mills, Colorado Fuel & Iron Corp., Denver. **R. Fred Whitlock** has been appointed advertising manager of the Colorado Div. of CF&I and will be responsible for the development of all media advertising, catalogs and promotional material for the division.

• **R. L. Wahl** has resigned as general superintendent of iron mines, Inland Steel Co., Chicago, and has retired to inactive status. **A. J. Cayia** has been appointed manager of ore mines and quarries, and **R. D. Satterley,** general superintendent of iron mines. Mr. Wahl has been associated with Inland for 31 yr, during which he served successively as superintendent of various mining properties, becoming general superintendent of iron mines in 1935.

° ° °

• **J. C. Vignos** and **R. L. Cunningham** have been elected vice-presidents of Ohio Ferro-Alloys Corp., Canton, Ohio. Mr. Vignos has for a number of years been general sales manager.

• **John D. James** has been appointed superintendent of the Grove City, Pa. foundry of the Cooper-Bessemer Corp. Mr. James, former assistant foundry superintendent of the Erie City Iron Works, succeeds **George Johnstone,** who recently resigned.

• **Arthur P. Schulze** has been appointed public relations director of Taber Instrument Corp., North Tonawanda, N. Y. He succeeds **L. S. Barker,** vice-president, who now will center his attention on sales management and customer service matters.

• **L. O. McLean** has been appointed sales manager of the General Excavator Co., Marion, Ohio. He became associated with the company in 1920 and succeeds **Don B. Smith,** who has resigned.

• **Elwin H. Schnitzler** has been appointed sales manager of the Mfg. Div. of Wheeling Machine Products Co., Wheeling, W. Va. Prior to the war Mr. Schnitzler was associated with the Sterling Oil and Quaker State refineries in a managerial capacity.

• **A. L. Carlson** has been named sales manager, **Jack F. Anschuetz,** assistant sales manager, and **Albert Clements,** chief engineer of Warren City Mfg. Co., Warren, Ohio. Mr. Carlson had formerly been associated with the Gisholt Machine Co., Otis Elevator Co., Giddings & Lewis Machine Tool Co., and the Harrington, Wilson Brown Co. Mr. Anschuetz was formerly sales manager of the Verson All-Steel Press Co., and was with the RFC, handling sales of surplus machine tools prior to joining the Warren City organization. Mr. Clements was also associated with the Verson All-Steel Press Co. prior to his coming to Warren City Mfg. Co. in 1945.

WALTER H. LIPPINCOTT, president and treasurer, Lobdell Co.

• **Walter H. Lippincott** has been elected president and treasurer of the Lobdell Co. of Wilmington, Del. He was formerly associated with Bioren & Co. before joining the Army in 1941.

• **Dr. W. M. Fiedler** has been appointed assistant chief geologist of the Inter-State Iron Co., and the Jones & Laughlin Ore Co., both subsidiaries of the Jones & Laughlin Steel Corp., Pittsburgh. Since 1944 he has been geologist at the Jones & Laughlin Ore Co.'s Benson mines in New York.

• **Eugene H. Heald,** who began work as a draftsman for American Bridge Co., Pittsburgh, 44 yr ago, retires on July 1 as vice-president in charge of sales and a director of the U. S. Steel subsidiary. He will be succeeded by **Norman B. Obbard,** who during the war managed the company's Ambridge, Pa., shipyard.

• **Walter F. Schneid** has joined Eastern Stainless Steel Corp., Baltimore, in the capacity of vice-president in charge of operations. Mr. Schneid has been connected, as superintendent, with the Crucible Steel Co. of America in Syracuse and, prior to that, with Rustless Iron & Steel Corp. in Baltimore.

• **L. W. Ward** has been appointed assistant sales manager in charge of the western half of the country of Pontiac Motor Div., General Motors Corp., Pontiac, Mich.

MERLE A. MILLER, treasurer, Joseph T. Ryerson & Son, Inc.

• **Ernest L. Hartig,** vice-president and treasurer of Joseph T. Ryerson & Son, Inc., Chicago, has retired after 45 yr of service. Beginning in the bookkeeping dept., Mr. Hartig was successively cashier, secretary and assistant treasurer, vice-president and secretary, and finally vice-president and treasurer, which position he has held since 1933. He will continue as a director of the Ryerson Co. **Merle A. Miller** has been elected treasurer. He has been with the Ryerson Co. for 24 yr and was formerly assistant treasurer and manager of the credit dept. **Frank H. Ziebell, Jr.** has been elected controller. He was formerly assistant secretary and has been associated with the company for 29 yr. **Thomas G. Miller** has been made assistant secretary, and **George W. Geiger,** assistant controller.

• **George T. Lundberg**, for the past several years supervisor of transmission design in the engineering dept. of Caterpillar Tractor Co., Peoria, Ill., has been named assistant to H. S. Eberhard, vice-president in charge of Caterpillar manufacturing, engineering, research and training. **N. E. Risk,** who is responsible for supervision of all engineering and coordinated activity pertaining to the application of allied equipment and special attachments, also assumes supervision of transmission design.

• **Herbert G. Austin,** who has been assistant district manager of sales in the Boston office of Lukens Steel Co. and subsidiaries, By-Products Steel Corp. and Lukenweld, Inc., has been named district manager of sales of the Boston office, succeeding **Robert H. McCracken** who has been appointed district manager of sales of Lukens' and By-Products' newly opened sales office in Cleveland.

• **C. K. Sherk** has been appointed purchasing agent of the Merchandising Div. of the National Supply Co., Toledo. He succeeds **John Kirby,** who will remain with the company in an advisory capacity for some time and then retire. Mr. Kirby has been with National Supply for 51 yr.

• **Edward F. Rossiter** has been appointed superintendent of the Goodyear Tire & Rubber Co.'s mechanical goods plant in Sydney, Australia, succeeding **C. H. Maxwell,** who has held the Australian post since 1930. Mr. Maxwell will return to the company's Akron, Ohio organization for reassignment.

• **William B. Keen** has been appointed superintendent of farm equipment production of Graham-Paige Motors Corp., Willow Run, Mich. For 17 yr he was factory manager of Fairbanks, Morse & Co., and following that spent 13 yr with the Dodge Div. of Chrysler Corp. in charge of materials.

• **F. M. Anable** has been appointed assistant to the vice-president of Victor Chemical Works. He will make his headquarters at the general offices of the company in Chicago, moving from Victor's Chicago Heights plant where he has been superintendent of production for the past 2 yr. **W. R. Dedert,** production superintendent of the Oxalic and Formic Acid Div. in Chicago Heights for a number of years, succeeds Mr. Anable as production superintendent for the plant.

• **Marvin W. Maschke** has been elected to the board of directors of the Metal Specialty Co., Cincinnati. He is chief engineer of the Metal Specialty Co. and was formerly production engineer with the Ternstedt Div. of General Motors Corp.

WALTER C. KERRIGAN, manager, nickel sales dept., International Nickel Co., Inc.

• **Walter C. Kerrigan** has been appointed manager of the nickel sales dept. of the International Nickel Co., Inc., New York, to succeed the late Rudolph L. Suhl. Mr. Kerrigan joined International Nickel in 1930 and has been an assistant manager of its nickel sales dept. since 1933.

• **Dr. Rex H. Wilson** has been appointed medical director of the B. F. Goodrich Co., Akron, Ohio, succeeding **Dr. Donald B. Lowe** who died Mar. 2. **G. A. Geer** has been named manager of the Seattle district of the Replacement Tire Sales Div., succeeding **Harry M. Baker,** who has retired after 33 yr of service with the organization. He had been Seattle district manager since 1931.

• **Lloyd C. Smith** has been promoted to vice-president and general manager of Heller Bros. Co., Newcomerstown, Ohio.

• **Stanley W. Cochrane** has been named director of purchasing for the Briggs Mfg. Co. succeeding the late W. J. Cleary. Mr. Cochrane was employed by Chalmers Motor Car Co., Maxwell and Chrysler Corp. prior to his association with Briggs in 1926.

• **Vernon S. Mullen, Jr.,** former assistant advertising manager of National Enameling & Stamping Co., Milwaukee, has been appointed manager of advertising and sales promotion.

• **Thomas P. Riley** has been appointed general superintendent of Carnegie-Illinois Steel Corp.'s Johnstown-Lorain works at Johnstown, Pa. He started with U. S. Steel at American Sheet & Tin Plate Co.'s Dover Works, Dover, Ohio, in 1908. In 1936 he was named superintendent of industrial relations for the company's sheet and tin mills in the Chicago district. The next year, he assumed the same position at Carnegie-Illinois' Irvin works, and in 1946 became assistant to the manager of operations of the Pittsburgh district, holding that position until now.

• **James E. Crum** has been appointed merchandise manager of the table appliance dept. of the Westinghouse Electric Corp.'s Appliance Div. at Mansfield, Ohio. Mr. Crum was formerly central district sales promotion manager and has been with Westinghouse at Mansfield since 1922.

• **J. L. Stone** has been appointed New York district sales manager and **Harry Gafke,** Chicago district sales manager of the Copperweld Steel Co., Warren, Ohio. Mr. Stone, until a recent date, was a metallurgical sales engineer for Copperweld and Mr. Gafke was a Copperweld contact metallurgist.

• **Walter K. Sittman** has been appointed technical adviser to the advertising dept. of Nash Motors, Nash-Kelvinator Corp., Detroit.

• **John G. Mapes** and **Bert C. Goss** have been named partners in the public relations firm of Hill & Knowlton of New York. Mr. Mapes for the past 12 yr has been in charge of the public relations dept. of the American Iron & Steel Institute. Mr. Goss acts in a similar capacity for the Aircraft Industries Assn. in Washington. He also serves as general manager of the firm's New York office.

• **William C. Schulte** has been named quality manager of the Curtiss-Wright Corp., Propeller Div. at Caldwell, N. J. He joined the Propeller Div. 4 yr ago as a metallurgical engineer and was subsequently appointed chief metallurgist. Before joining Curtiss-Wright he was associated with the A. O. Smith Corp. and the Lukens Steel Co.

ROBERT H. OWENS, vice-president in charge of engineering and manufacturing, Roots-Connersville Blower Corp.

• **Robert H. Owens** has been elected vice-president in charge of engineering and manufacturing of Roots-Connersville Blower Corp., Connersville, Ind. He joined the engineering staff of the company in 1925.

• **George C. Tolton** has been appointed American Foundry Equipment Co. sales representative for the Northwestern states and will have his office in Seattle. Mr. Tolton's most recent association was with the Bureau of Yards and Docks of the 13th Naval District and before that with the Austin Co. of Cleveland. **Anthony Stimmler** will represent the company in the new Minneapolis sales office. He has, for many years, been engaged in sales engineering for the Mechanical Div. of General Mills. **Mitchell P. Christensen** has been appointed sales representative in the newly created Denver territory and will have his headquarters in that city. During the war he served as principal metallurgist and assistant chief of production in a branch of the Chicago Ordnance District.

• **Merrold S. Johnson** has been named manager, Advertising & Sales Promotion Div., Edison General Electric Appliance Co., Chicago. He comes from Arnold Schwinn Co.

• **J. F. MacEnulty** has been elected chairman of Pressed Steel Car Co., Inc., Pittsburgh, succeeding **Lester N. Selig,** resigned. Mr. Selig also resigned as a board member.

• **Charles F. Hill,** associated with Carrier Corp. since 1934, has been made president of the new Carrier Engineer, Ltd., Canada and Newfoundland, and will assume the post July 1.

• **Willard W. Boeswetter, Carroll A. Pickering** and **Eugene B. Hauser** have been added to the field and service force of the Hanson-Van Winkle-Munning Co., Matawan, N. J. Mr. Boeswetter has been assigned to the main office at Matawan in electrical sales work. Mr. Pickering, employed by Fairbanks Morse & Co. as an electrochemist before the war, is in the Chicago office as a field engineer. Mr. Hauser who was employed as a design engineer of Hanson-Van Winkle-Munning from 1940 to 1942, has been assigned to the New York office of the company.

...OBITUARY...

• **W. Raymond Lane,** 61, assistant district sales manager of Republic Steel Corp.'s Detroit office, died recently after a brief illness.

• **Charles E. Cummings,** 79, assistant secretary of Raybestos-Manhattan, Inc., Passaic, N. J., died June 6.

• **Christian Girl,** 71, formerly head of C. G. Spring & Bumper Co., died recently in Cleveland. He retired in 1929 after merging his company with Houdaille-Hershey Corp.

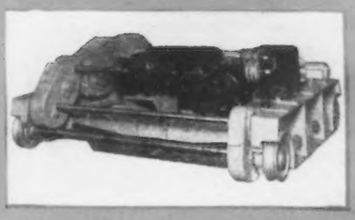
• **Charles A. Corrigan,** of the Rockford Machine Tool Co., Rockford, Ill., died June 15.

• **Frederick N. Dillon,** 74, vice-president and treasurer of the D. M. Dillon Steam Boiler Works and president of the Brown Bag Filling Machine Co., both of Fitchburg, Mass., died recently.

• **William J. George,** 52, assistant to the president of Edgewater Steel Co., Oakmont, Pa., died June 17. He had been associated with Edgewater Steel Co. since its organization in 1916.

46,000 POUNDS WEIGHT SAVED

ALUMINUM CRANE built by NORTHERN ... In Satisfactory Operation over 15 Years



Illustrated here is a crane of 10 ton capacity, 76' - 6" span, built almost entirely of aluminum alloy castings and rolled aluminum structural sections. The total weight including the trolley is only 30,000 pounds. The same crane, constructed of steel, weighs 76,000 pounds.

Six of these cranes have been in continuous service since 1929, and have proved satisfactory in every detail. The light weight has substantially reduced the cost of power. Operation is speeded and usefulness increased by the faster acceleration and deceleration. Light weight reduces wear on operating parts, and materially reduces the load on the building itself.

Use of aluminum in construction of these cranes is a unique application of light metals in the material handling field.

2074

NORTHERN ENGINEERING WORKS

General Offices: 2625 ATWATER ST. DETROIT 7, MICH.

HEAVY DUTY CRANES • LOW HEADROOM CRANES
BUCKET CRANES • TRANSFER CRANES • ELECTRIC HOIST CRANES • HAND CRANES • ELECTRIC HOISTS
AIR HOISTS • SPECIAL CRANES AND HOISTS

Dear Editor:

HIGH TEMPERATURE ALLOYS

Sir:

The recent article entitled "High Temperature Alloys," obtained from the Publications Board in Washington, which has been appearing in your publication, has proved to be of much interest to a large number of readers.

I should like to point out to them that the information in this article covered experimental work done up to the latter part of 1944 and does not include considerable additional work which has been done since. This more recent work modifies to a certain extent the articles appearing in THE IRON AGE, but more important it makes a considerably more complete story of high temperature alloys. These articles cannot be considered final. The bulk of the information contained in them plus the additional information referred to has been compiled as a single report which will appear in publication in the near future.

NICHOLAS J. GRANT
Dept. of Metallurgy
Massachusetts Institute of Technology
Cambridge, Mass.

MOTION TRANSFORMER

Sir:

Could you please advise where information may be obtained on the motion transformer mentioned in Newsfront of the Feb. 28 issue.

H. KERNS
Waldorf & Kerns
New York

● The unit was developed at the Utah Scientific Research Foundation, Utah State College, Logan, Utah. A complete report on the mechanism may be obtained from E. C. Hutchinson, acting director, Office of Production Research and Development, Temporary Building R, Washington 25. Ask for report covering project No. 757, Contract No. 205.—Ed.

NIGERIAN INQUIRY

Sir:

Kindly send me your free sample of your catalog. If you can send it to me as quickly as possible I shall recommend you to all my best friends in Lagos. May you live long. God will help you in all your works and give you good health. Awaiting for your favorable reply by next coming mail.

NOSIRU ANNEY
Lagos, Nigeria

● We share your hope for a long life, Mr. Anney, and appreciate your kind wishes. A copy of the latest issue is being mailed you.—Ed.

METRIC V. ENGLISH SYSTEM

Sir:

I am attaching a copy of a letter I have written to J. F. Dreyer, Jr. (See Dear Editor, p. 108, May 9 issue). This material is too long to print and, probably too long to read but I wanted to have my opinions presented, at least, before your august selves. You might file this data in case you ever feel the need of help to fight an effort to force the U. S. into using the metric system, which would really be, in my opinion, an effort (by other nations) to compete with us by introducing a little confusion much the same as the present wave of strikes has been assisted by those who would be glad to see us go unreconverted until they are in a better position to compete.

C. C. FINN
John Finn Metal Works
Seattle

● Reader Finn's presentation of the case against a change in this country from the English to the metric system of weights and measurements is a practical, scholarly and thorough statement of facts. We have made a few copies of this 10-page statement which will be mailed to interested subscribers, upon request, as long as our supply lasts.—Ed.

ANTIMONY IN STEEL

Sir:

Please send me tear sheets of the article "Antimony in 18-8 and Plain-Chromium Stainless Steels," published in the May 16 issue.

W. L. BULKLEY
Development Engineer
Servel Inc.
Evansville, Ind.

MR. MORROW'S STATEMENT

Sir:

We would like to obtain an address by Mr. Hugh Morrow before the Senate Banking Committee regarding the extension of OPA. We understand Mr. Morrow represents a glass furnace or pig iron institute. We would appreciate any suggestion that you might make as to where we could obtain a copy of his remarks.

A. KING McCORD
Vice-President
Oliver Corp.
Chicago

● We believe you have reference to a statement made Apr. 29 by Hugh Morrow, president, Sloss-Sheffield Steel & Iron Co., Birmingham, before the Senate Committee on Banking and Currency. Mr. Morrow, who represented the merchant pig iron producers, recommended specific profit standards by Congress for the remainder of the price control period (see issue of May 9, p. 94). Copies of Mr. Morrow's testimony are being forwarded you.—Ed.

BRITISH INSTITUTE PAPERS

Sir:

The issue of May 16 contains a list of papers presented at the technical sessions of the recent annual meeting of the British Iron & Steel Institute in London. I would like to obtain copies of these papers. Any information you can give me as to how to do so will be greatly appreciated.

D. J. ASQUITH
Moore Drop Forging Co.
Springfield, Mass.

● We have single copies of these papers in our office here which we would be glad to loan you. Or you may write directly to the institute at 4 Grosvenor Gardens, London SW 1. Our European editor, J. R. Hight, 49 Wellington St., Strand, London, WC 2, will be happy to assist you in this respect. Another possible alternative is to get in touch with the library of the Engineering Societies, 29 W. 39 St., New York, to determine whether or not photostatic copies of these papers are available.—Ed.

FILE HARDNESS TEST

Sir:

I understand that in your Sept. 24, 1942 issue you had an article on "File Hardness Testing." Will you kindly send me a copy of this article.

WILLIAM J. BLAZEK
Factory Manager
Evans Reamer & Machine Co.,
New Lexington, Ohio

● Tear sheets have been sent.—Ed.

DISMOUNTABLE MOTORS

Sir:

In the article "Dismountable Electric Motor Cuts Repair Time," Apr. 11, p. 53, I am not sure whether or not this motor which you refer to is available by any agent or supply house in the U. S. or in fact if you could tell me if they are ready for delivery in the U. S. or, if not, in Spain, and if so, where should I write in order to make a connection with them. . . .

J. W. MOORE
John Moore Specialty Co.
Chicago

● To the best of our knowledge this motor is not yet available in this country. Additional details concerning its availability may be obtained from A. J. Gibbs Smith, 477 Streetsbrook Rd., Solihull, Warwickshire, England.—Ed.

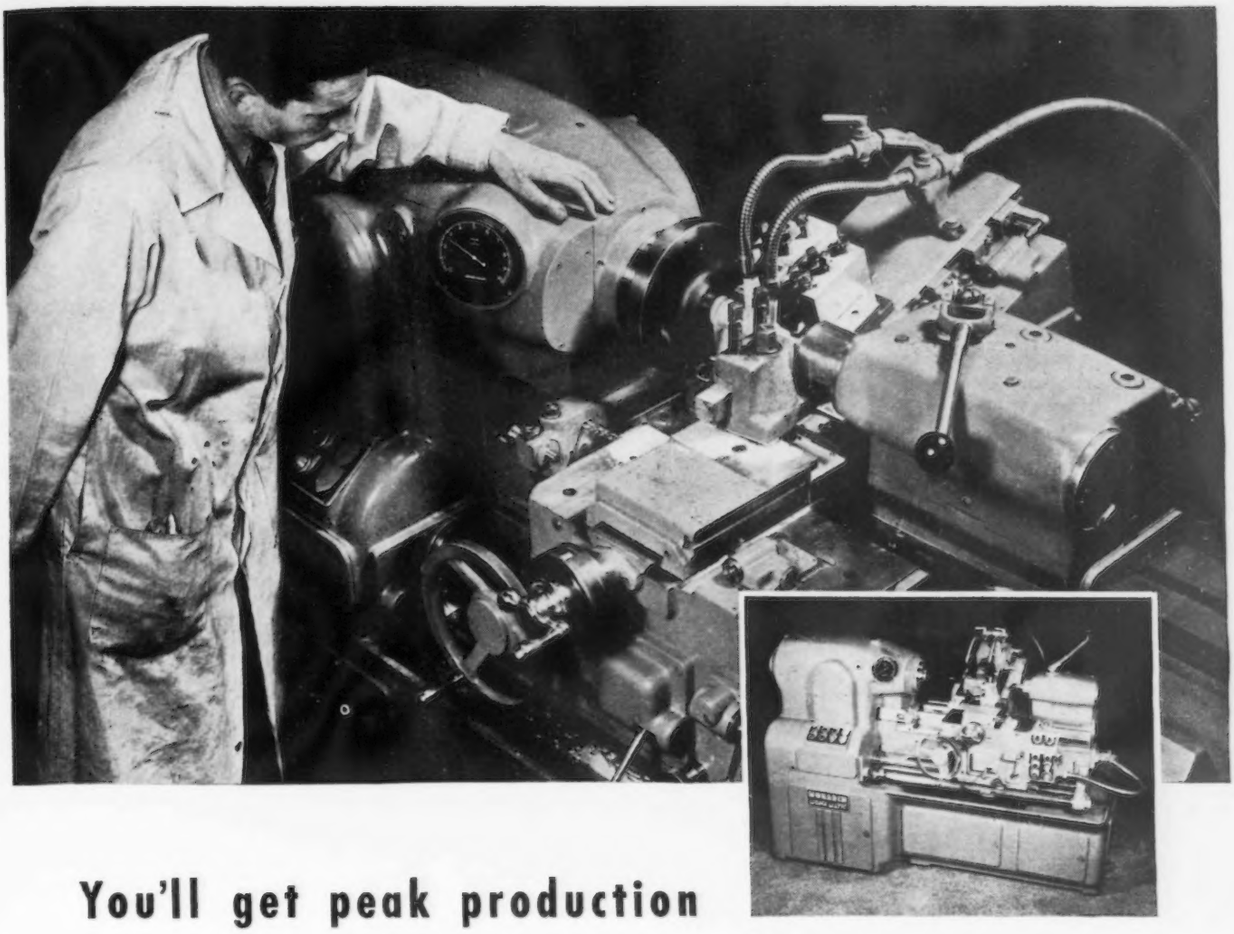
STATIC MOLDS

Sir:

Would it be possible for you to forward a reprint of an article that appeared in the Jan. 17 issue on static molds by S. T. Jazwinski and S. L. Finch.

ROBERT NEIMAN
Director of Research
Whip-Mix Corp., Inc.
Louisville

● We didn't reprint "High-Pressure Feeding of Static Molds," but have mailed you tear sheets with our compliments.—Ed.



You'll get peak production

AT A PROFIT — with the *Mona-Matic**

Fully automatic cycle—or fully manual—or any combination. Between-centers work as fast as carbide tools and modern metals can take it—spindle speeds up to 1000, 2000, 3000 and even 5000 RPM.

That's the kind of work you can do on the Mona-Matic. Regardless of exacting tolerance requirements, you'll get floor-to-floor time you'd ordinarily think of only in connection with specialized one-purpose machines—and at the corresponding low machining costs usually restricted to mass production methods.

Yet with the Mona-Matic you'll have an almost universally adaptable machine—one you can use on big lots and small, year in and year out. The front carriage is built with power feed and rapid traverse return; the independent electrically controlled rear slide may be added as a separate unit.

* **MONA-MATIC** — Add this new name to your metal-turning dictionary — You'll be hearing a lot of it — wherever rising production costs are a factor. The *Mona-Matic* is Monarch's answer to this problem in the field of between-centers work. For chucking and fixture work it's the *Uni-Matic;* for hand screw machine work the *Speed-Matic.*

Get full details on these three new machines *now* — from your nearest Monarch representative — or write us direct.

The Monarch Machine Tool Co. · Sidney, Ohio

ACCURACY · ECONOMY · LONG LIFE

Monarch
TURNING MACHINES

This Industrial Week . . .

- **Scrap Is Steel Industry's No. 1 Problem**
- **OPA Extension Dashes Higher Price Hopes**
- **Steel Rate Rises 2.5 Points to 88.5 Pct**

STEEL producers this week were facing one of the most serious shortages of iron and steel scrap since wartime peak production in 1942-43 when national scrap drives and agitation for higher scrap prices were the general rule. Until such time as manufacturing operations among steel consuming groups reach a much higher rate than at present, there is little chance of this situation being alleviated.

While some dealers and scrap producers are reported to have been holding back supplies in the hope of higher prices, the fact that OPA will be extended has eliminated, for the time being at least, any chance for higher ceilings on iron and steel scrap. It is assumed that any products, the supply of which is far below actual demand, will continue to be controlled by OPA.

The tonnage of scrap which is believed to have been held back recently during the national price controversy would represent only a small part of total scrap activity. When this tonnage starts to flow into consuming channels, it should have little or no effect upon the general supply picture. The present shortage of scrap has been aggravated by the increased use of scrap during the past two months when pig iron output was abnormally low.

Some steelmakers are pinning their hopes on a greater supply of pig iron over the next few months as renovated blast furnaces are brought back into production. The contemplated action of the government to bring in some government-owned and some high cost blast furnaces may help the situation when and if this action is taken. It is possible, however, that the present delicate balance between coal supplies and coal demand may result in the temporary shortage of coke for blast furnace fuel. Over the long run, however, the outlook for increased pig iron production is promising.

IN the face of scrap shortages, hot weather and other production difficulties, the steel industry this week was able to advance its operating rate 2½ points to 88.5 pct of rated capacity. This figure represents a weekly production of steel comparable with peak periods which followed the temporary setback after VJ-Day. While some steel officials believe that the current scrap shortage will not only prevent the rate from going any higher, but will likely cause it to decline, this opinion is not uniform throughout the industry. Many times since the first of the year industry predictions on the speed of recovery from setbacks in output have been too conservative.

The recent increase in the price of nails has caused some expansion in output, but many contractors throughout the country are still without nails on actual jobs. The improvement in production, however, is expected definitely to benefit the housing situation within a short period. The full volume of nail output, however, will not be realized because some capacity is still idle which it is claimed is due to insufficient return even on the basis of the latest price increase.

Mills having high-cost capacity which have individually requested price increases higher than the recent $10 a ton boost are still waiting for OPA's answer. It is probable that these firms will take no additional nail tonnage until such time as additional price relief is granted.

Currently wire mills have been experiencing a shortage of fine gage wire for the manufacture of specialties, wire rope and fencing. While there is sufficient machine capacity for producing wire fencing, the shortage of wire is keeping the volume of output down. An abundant hay crop has accentuated the shortage of bale ties and coiled baling wire. Farmers are using any type of wire available in order to prevent a serious livestock loss if the harvest is not fully utilized.

THE recent action of CPA in instituting priority treatment for warehouses and the farm implement industry so far has had little effect for the simple reason that both these groups were being given voluntary preferred treatment by steel firms. In the last analysis almost any government-instituted form of relief will follow the same general lines as the quota plans now existent in almost every steel company.

In the nonferrous field consumers of nonferrous metals are gradually recognizing the fact that shortages of lead, tin, copper, zinc and silver are worldwide in scope and likely to continue indefinitely or at least until exploration reveals significant new deposits. Government subsidized purchases abroad starting with the war have served to obscure the significant rise in world prices of these metals which is due only in part to the runaway inflation present in most foreign mining areas.

WITH chances certain that OPA's life will be extended, controls over prices of iron and steel products should continue as long as the supply falls far short of demand. However, it is expected that from time to time individual steel products will be decontrolled when supply and demand are in balance or when there is no question of a shortage. OPA has already taken such action on a few steel items, and has insisted that controls will be dropped on other products as conditions warrant. On the other hand if a special decontrol board is set up under the auspices of Congress, controls may be removed more rapidly than if the sole power to make decisions rested with OPA.

The U. S. Steel Corp. plans immediate resumption of large scale operations at the newly acquired Geneva Steel Co. Representatives have already moved in an attempt to establish a working force of from 4000 to 5000 as a goal. At the time the plant was sold by the government, it was manned by about 200 standby workers.

• **LABOR OUTLOOK**—United States Employment Service reports that since the end of the war, labor shortages have largely disappeared and considerable unemployment is common in many parts of the state of Illinois. Meanwhile, requirements for additional workers have been sharply reduced because of unsettled labor market conditions, shortages of material and equipment, and production delays because of price uncertainty.

• **BIG ORDER**—Pullman Standard Car Mfg. Co. has just received one of the largest orders for railroad passenger equipment since V-J Day. Ninety-five streamline cars placed jointly by the Atlantic Coastline Railroad, the Pennsylvania, the Florida East Coast Railway and the Richmond, Fredericksburg & Potomac Railroad makes up the award. The cars include 52 sleeping cars, 30 coaches and 13 dining cars. All will be built with stainless steel sides and roofs. Eleven of the dining cars will accommodate 36 passengers with a new diagonal seating table arrangement.

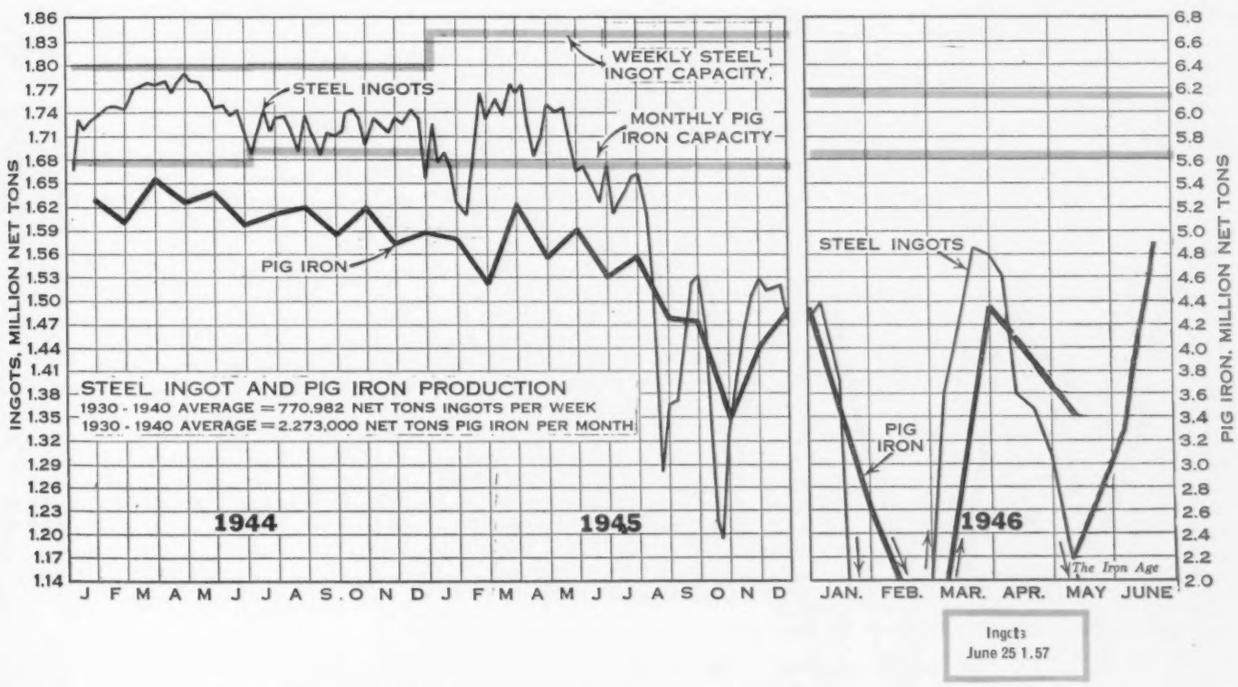
• **IMPLEMENT PRODUCTION SPOTTY** — With plants of three full-line implement producers still strikebound, production of sufficient equipment for the harvest appears unlikely, particularly if exports must be made. Manufacturers in production fear that the full impact of the coal strike on steel suppliers is yet to be felt. Limited priorities afforded under Direction 12 to M-21 are not counted on for any big-scale relief.

• **SOME BRIGHT SPOTS ON SHEETS**—Mills which held the throttle to the floor on sheet and strip production during the coal strike, now have whittled backlogs considerably. Many producers, however, let production of these items drop along with others, so the industrywide situation is not much improved. Those mills which bettered their situation are keeping it quiet for fear customers will ask boosts in quotas.

• **1947 QUOTAS DUE NEXT MONTH**—Many producers now have advised customers of third and fourth quarter quotas. Variations in quotas allowed are widely varied among producers and some mills on some products are allowing quotas equal to those originally set up for the first quarter. Others, hard hit by production delays, are shaving quotas by as much as one-third. Quotas for 1947 are expected the latter part of July or the first part of August.

• **ELECTRICAL EQUIPMENT** — With the electrical workers' strike pretty well by the boards, producers are making all-out drives to get production closer to demands. The tightest spots, however, appear to be in small motors and certain industrial electrical equipment. Small motor backlogs are running about 16 months and equipment for such items as electrical metal melting furnaces are getting deliver promises about 12 months hence. One thing gratifying to manufacturers is that man-hr output is better. While not true in specific minor instances, output per man-hr has been climbing steadily since the end of the strike.

• **FREIGHT CAR OUTLOOK**—With orders for nearly 40,000 freight cars for domestic railroads, 36,750 for the French, some new Russian and possibly other foreign business, carbuilders are on a spot for materials. The main difficulty is that unless a complete line of components are available, carbuilding can be stalled. Consequently, any item that is short will have an immediate effect on car production. On the sunnier side, however, is that fact that carbuilders bit into backlogs a little in May, delivering 3608 new cars and June should show even better production. From Jan. 1 to May 31 this year, railroads have put 14,723 new cars into service, compared with 18,818 new cars during the same period last year.

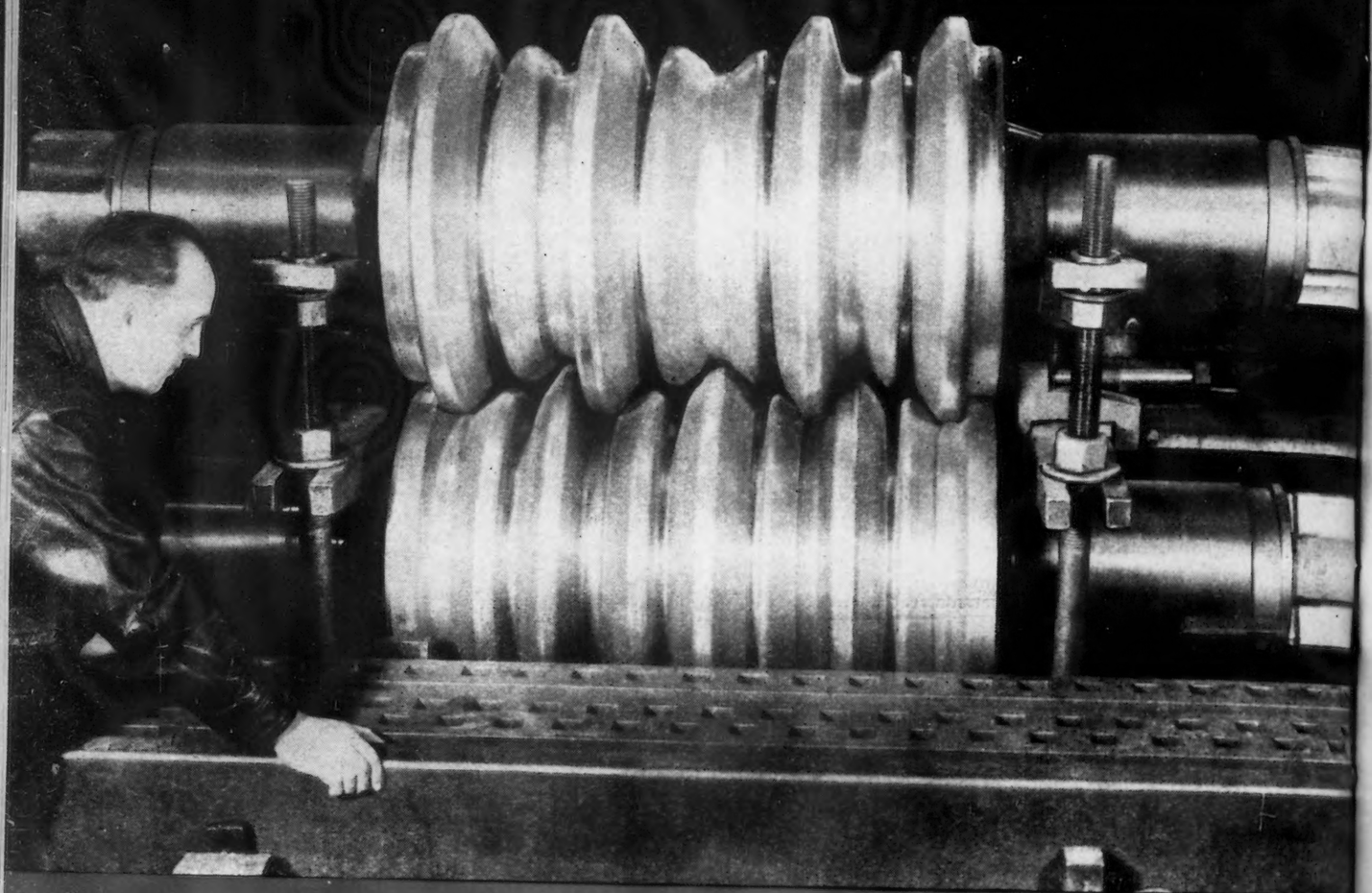


Steel Ingot Production by Districts and Per Cent of Capacity

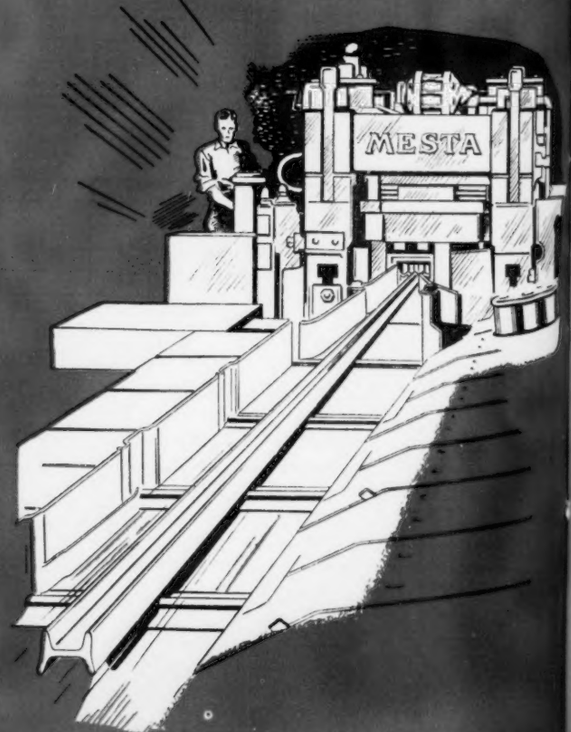
Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
June 18	88.0*	86.0	81.0	85.0	85.0*	102.0	92.0	95.0	101.5	57.0	104.0	60.0	87.0	86.0
June 25	93.0	88.5	87.0	90.0	87.5	102.0	92.0	99.0	100.5	60.0	99.0	60.0	87.0	88.5

* Revised

MESTA *Rolls*



Mesta Merchant Mill Rolls
for Rolling I-Beams



MESTA MACHINE COMPANY

PITTSBURGH, PA.

Belgian Steel Export Drive Aided by Rapid Deliveries

Brussels

By JACK R. HIGHT

• • • **Following an** ambitious period of soliciting orders, the Belgian steel industry is now refusing new business in order to keep backlogs within reasonable limits. In view of the changeability of prices in the export market, it is hoped to keep the business on the books to within what may be delivered in 3 or 4 months. Recent delivery promises have been averaging 5 to 6 months.

Current Belgian steel production is being divided at the request of the government on the basis of 50 pct for direct export, 15 to 20 pct for indirect export, and the remainder for domestic consumption. Some skeptics from outside the country suggest that the direct export figure is nearer 60 pct. This division compares with prewar practice of sending 50 pct out directly, and using about 30 pct for indirect exports. The decrease in allocation for indirect exports is due to the need for replacing worn-out equipment in Belgian industry and making repairs on war-damaged installations.

Production in the Belgian industry is averaging about 56 pct, on the basis of a 1938 average of about a 7 million ton annual capacity. January production of ingot steel this year amounted to 168,000 net tons, February 159,000, March 180,000 and April 182,000.

The existence of a domestic price ceiling of 2650 Belgian francs ($60.22) for merchant bars makes the high price export market a desirable one to the steel producers, and makes the allocation system necessary for the domestic market. In comparison to this figure the Belgian steel sales organization (S.I.P.E.L.A.C.) is charging at least two other sets of prices for the export market, and until recently was using a still different price scale for re-export steel.

While the merchant bars go to the domestic consumer at $60.22 per metric ton, the price to Switzerland is 4800 Belgian francs $109.09) per ton, and 3600 francs ($81.81) to Sweden. The Swiss and Swedish markets as far as the Belgian industry is concerned are known as "controlled" markets, inasmuch as the Belgian Government has entered into commercial agreements with Sweden and Switzerland to deliver each month a specified amount of steel products at a fixed price. The Netherlands, Denmark, Norway and Portugal are also controlled markets in this sense.

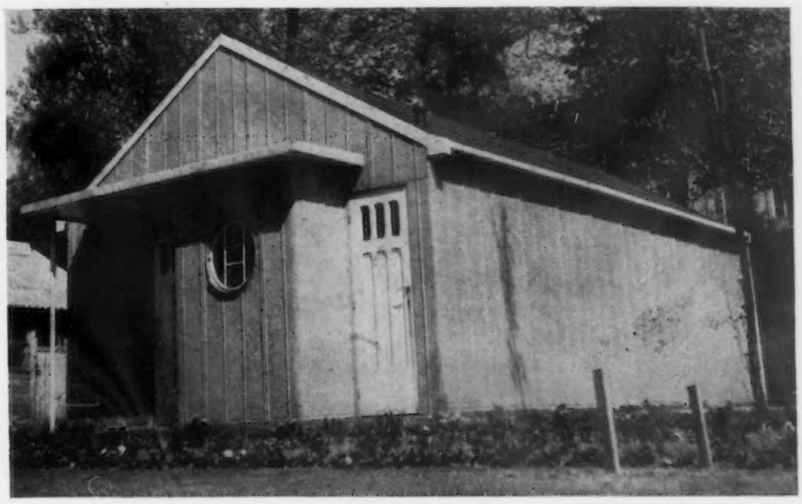
The variations in price to the various controlled markets depend, of course, upon the relative urgency of Belgium's need for the imports which she gets in return for her steel. Thus Sweden, which is exchanging its high grade iron ore for Belgian steel gets the benefit of a low price for steel as mentioned above, while Switzerland which must offer finished manufactured products and consumer goods in return for the steel, items which the Belgian Government is less anxious to obtain, pays a price penalty.

According to some sources export commitments based on commercial agreements average about as follows per month: Netherlands 38,500 net tons, Sweden 22,000, Denmark 19,800, Norway 14,300, Switzerland 11,000. In the case of these controlled markets through the selling agency the Belgian steel producer is told what share of the total tonnage he will bear and the price he will charge. In the "free" markets, however, the powerful S.I.P.E.L.A.C. dictates only the tonnage he is allowed, and he is theoretically free to negotiate his own price.

While Belgium must out of necessity continue to be an important steel exporter, her position pricewise in the international market appears to be slightly different today from what it was before the war. For example, in a free market today a nominal price for merchant bars at a Belgian mill would be about 3900 francs ($88.63) per ton. From information available here, it seems that similar prices, not including any freight charges for British steel would be about 3500 Belgian francs ($79.54), and for American steel about 3000 Belgian francs ($68.18).

Thus the Belgian is usually in the position of being the high-priced seller in comparison to other countries. To compensate for this factor the Belgian industry is deliberately following the policy of keeping its backlogs as low as pos-

UNIVERSAL HOUSING SHORTAGE: *This house made of assembled metal panels was shown recently at an exhibition sponsored by the Belgian Government. The purpose was to encourage the construction of prefabricated houses.*



sible at the expense of flatly refusing orders when the total volume of uncompleted business begins to get unwieldy. Thus when S.I.P.E.-L.A.C. sends a cable to Brazil offering 500 tons to cover a specific need, it will probably ask 20 pct more for the steel, but will offer 3 to 5 months' delivery where American and British producers are talking in terms of 6 to 12 months.

For a country which has comparatively small quantities of steel to offer for sale, and in a strong seller's market, it is possible to keep all facilities available working at top speed. The reputation which many American firms as well as British have built up within the past 6 months has made the job much easier. From September through November of 1945 most American and British steel firms felt that by the middle of this year they would have plenty of steel to deliver to any market in the world.

Deliveries on these orders have been bad, and many potential consumers are still waiting for steel which they expected months ago. Probably for reasons which originally had to do with future prices, the Belgian industry did not get itself into such a position, although Belgian steel companies certainly hoped that by July of this year they would be operating at 100 pct capacity rather than at 55 pct.

Contributing to the present position of the Belgian steel industry in regard to prices has been the changed wage position in the Belgian industry. While it is true that steelworkers in America and England are being paid considerably more than prewar, there is little comparison with the changes that have been wrought in Belgium. The official average wage for steelworkers in Belgium is 2.2 times as great as prewar.

Added to this increase are numerous extra expenses which the steel producers are bearing at present to help the Belgian steelworkers through this difficult inflationary period when prices have risen even more rapidly than wages. The social security program enacted by the postwar government accounts for another 15 pct increase in steelmaking costs and will also affect the long run position of Belgian steel prices.

To counteract these price increases the Belgians are using one other device which offers some benefit to consumers, in that in most cases they are willing to quote firm prices, if they are going to be able to deliver within 3 or 4 months. This prospect offers obvious benefits in comparison with the usual American or British practice which writes a contract on the basis of an indefinite delivery date and promises to charge the prevailing price at the date of delivery.

While there is considerable complaining that the domestic price ceilings are too low, it is probable that these figures do in fact cover all production costs and make possible a modest profit margin. The steel industry is being protected by a subsidy on coal so that a ton of coal which would cost 600 francs in a normal market goes for 400 francs, while the government pays 200.

There has been some pressure to eliminate this subsidy at least in certain situations as far as the steel industry is concerned. Thus until recently it was the practice to charge an intermediate price between the export and domestic prices for steel being delivered to Belgian industries, which would be in turn used for the export market. The effect of this was to give the Belgian industry a premium export price for 50 pct of its steel shipped directly, and an increased profit margin on possibly 20 pct more which was for re-export.

When it became evident that some concession must be made on this price schedule, the steel industry gave up the premium on steel for re-export. This was done in order to eliminate the possibility of the government requesting the return of the coal subsidy for all coal being used to produce steel for direct or indirect export. Although this coal subsidy will probably be eliminated at some time in the future, it seems safe for the immediate future until the proposed reorganization of the coal industry can be effected.

The controlling factor on Belgian steel production in common with most European countries is coal production, and it is safe to say that any appreciable variation that is noted in the Belgian ingot production curve over the next 2 yr will be directly tied to coal production and allocations. At present there are somewhat fewer men employed in the Belgian coal mines than before the war, and about one-third of the men in the mines are German prisoners of war.

The average productivity of the Belgian worker is below prewar standards, and the German prisoner is producing one-third of what the average Belgian miner produces. The Belgian coal industry seems likely now to get 15,000 to 25,000 voluntary Italian laborers during the next 12 months. It is improbable that Italy will furnish these workers without some provision

POUR ON THE COAL: *The hungry furnaces are drooling for these trains of Black Diamonds. The Williamson yards of the Norfolk and Western gather 300,000 tons a week in the West Virginia area.*

for increased exports of coal from Belgium to alleviate the dire Italian need, so the ultimate benefit to the Belgian steel industry may be small.

The second most important factor is the labor supply, but its effects are very slight in comparison with the coal question. At the present time there is only a small indication in a few allocations that there is a potential labor shortage at certain steel mills. Unlikely as the prospect is, if large quantities of coke should become available to the industry within the next year, a serious labor problem would probably develop, but from a long-range standpoint the prospects are that the Belgian steel industry will have adequate labor.

The organization of the Belgian steel industry has been altered but little during the war years, and, although the names of some of the trade associations have changed, their personnel and functions have been largely static. The control by the two large Belgian banks, of a predominant portion of both the pig iron and steel melting industries and the production of finished steel, has emerged stronger than before the war.

In line with the dictates of technical development, there seems to be a trend to drive the rerolling trade and the steel melting industry more closely together, but important pockets of resistance remain active.

The steel sales organization which was known as COSIBEL before the war became S.I.P.E.L.A.C. during the war. The only important change was that, while COSIBEL was at least in theory a voluntary organization insofar as there was no official governmental pressure to force any company to belong, S.I.P.E.L.A.C. has been a compulsory association. At present S.I.P.E.L.A.C. is in the process of liquidation, mostly because of its occupation ties, but it will be succeeded by another organization, which will again be voluntary, to perform roughly the same functions.

It is hoped by many that the new organization will have additional powers to buy all raw materials for the industry, writing all contracts for both purchases and sales of iron and steel. Probably the most important fact in this shuffling of trade association names is that the same individuals are operating the business — that is the people who called themselves COSIBEL from 1933-1939 call themselves S.I.P.E.-L.A.C. today and will be calling themselves under some other name tomorrow. While the names change the director generals of all the steel firms continue to meet every Tuesday in Brussels and there discuss communally their problems, including labor relations, modernization, *rationalization of facilities, prices,* and *tonnage allocations.*

In consideration of the opposition in other parts of the world (Washington), there exists today no signed steel marketing agreement that could properly be described as a normal domestic cartel, but these weekly meetings are admittedly a "gentleman's agreement" with precisely the same functions.

Belgian steel executives feel strongly that, regardless of the exact nature of the international steel trade in years to come, there must be some body established to perform functions that were carried on by the international steel cartel before the war, and predict that whether it be in private or government hands such a body will develop within the next 2 yr.

Modernization plans for the Belgian steel industry are in the category of official secrets over here, but they undoubtedly exist in some form. The mills recognize a greatly expanded market for sheet, and are thinking in terms of a continuous strip mill for the near future. The rolling mill known as L'Esperance-Longdoz at Liege, which has in the past dominated the sheet market, seems destined to be the operator of such a mill if it comes to pass.

In keeping with its idea of being strong in a small tonnage-rapid delivery market, the Belgian industry is also planning the establishment of an extraordinary steel warehouse in the port of Antwerp. The intention here would be to carry stocks beyond the categories customarily available for immediate shipment.

Although possibly less intensive than in Britain, the Belgian steel industry is working against a definite steel export goal for this year, as a part of the country's overall export drive. The total exports of all products for this year is hoped to reach 26 billions of francs ($590,900,000), and the goal for the steel industry is 6 billions of francs ($136,300,000). Although the figures for the first four months of the year have been well below those totals, industry opinion here is that the quotas will be met.

PROUD STEELMAKER: *Benjamin F. Fairless, president, U. S. Steel Corp., was presented with the Medal for Merit on June 20 for his voluntary services as advisor to the Army's Chief of Ordnance on wartime problems of management, production and supply. The award, the highest honor which the President can designate, was presented by Secretary of War Robert P. Paterson, left in the picture. To the right of Mr. Fairless is General of the Army Dwight D. Eisenhower, Chief of Staff. Other high ranking officers and prominent civilian administrators and industrialists attended the award.*

Steel Industry to Be Affected By Latest ICC Freight Rate Boost of 6 Pct

Washington

• • • **Freight rates** in iron and steel, scrap, pig iron, castings and machinery were increased 6 pct throughout the country, except in official classification, in the general interim rate decision announced by the Interstate Commerce Commission on June 22. In official classification territory these rates were boosted 11.3 pct. Rates on iron ore were increased 2¢ per gross ton in the East, while in the southern and western districts they were increased 3¢ and on interterritorial traffic the increases were 3¢ and 3½¢ per ton, net or gross, as rated.

Rates on coke and bituminous coal were increased 3¢ per ton. In the case of Lake ore the total rate boost on this traffic is 5¢ per ton by reason of the 3¢ increase from mines to the upper docks and 2¢ increase from the lower Lake docks to interior furnaces. Also added was a ½¢ per ton increase in handling charges at each of the upper and lower ports. With added accessorial charges the total increased costs of iron ore delivered to eastern furnaces from Lake mines will exceed 6¢ a ton.

Under the decision the present line haul rate on ore from Minnesota ranges to upper docks will be increased from 81¢ to 84¢ per gross ton; the 78¢ rate from Michigan and Wisconsin mines to Escanaba, Mich. and Ashland, Wis., will be increased to 81¢ while 3¢ a ton will be added to the 54¢ to 60¢ rates from the Marquette range to Marquette, Mich.

These temporary rate increases were granted by the Commission pending a hearing on the so-called general 25 pct rate increase carriers petitioned for in April and they became effective July 1 on 3-days' notice. The higher rates were granted by permitting the restoration with modifications of the emergency freight increases authorized on May 2, 1942, which have been under suspension since July 1, 1944. The increase on iron and steel in that proceeding was 6 pct per ton. No increases were granted in iron ore rates. In the present case the 6 pct emergency rate increase on steel and other production was given a further boost of 5 pct for application to official classification territory, making a total increase of 11.3 pct.

•

Pittsburgh

• • • **Mills are** anxiously awaiting clarification of two proposed increases in freight rates and are wondering what will happen to West Coast shipments should the rates be increased on rail and ocean shipments and on domestic rail shipments. The proposed intercoastal rate increase of 0.015¢ per cwt or 50¢ a ton plus a 3 pct increase on War Shipping Administration controlled ships will practically shut off steel movement to the Coast. These increases, it is estimated, amount to about $1 a ton on top of the $5 to $6 a ton already absorbed by the mills under this arbitrary delivered price setup.

Being arbitrary delivered prices, mills cannot pass along the rate increases to the West Coast unless adjustments are made in the prices by the OPA. This means, in effect, that mills will sharply cut into their West Coast deliveries and West Coast consumers will have just that much less steel than they are now getting.

The domestic rail freight rate increase being considered by the Interstate Commerce Commission will have the same effect on steel companies where arbitrary prices are quoted, such as in Detroit. The freight rate from Pittsburgh to Detroit on certain products is now in the neighborhood of $5.60 a ton, $2 of which is collected under the arbitrary delivered price, and $3.60 is absorbed by the producer. The amount collected by the mills will remain the same unless OPA grants some relief, and the amount absorbed will be equal to the increase in freight rates.

If OPA relief is not granted on the rail and ocean rate increase, it is fairly certain that eastern mills will cut West Coast shipments and attempt to revert to all-rail shipments to the coast with sales based on Chicago basing point prices. Freight from Chicago to West Coast destinations runs in the neighborhood of $22 a ton, but the customer pays the freight. Thus, mills will base steel out of Chicago, ship by rail, and lose less than would be lost on rail and ocean shipments to destinations with arbitrary delivered prices.

THE ARMY'S FLYING BUZZ-SAW: *This AAF R-5 Sikorsky helicopter powered by 450 hp Pratt & Whitney engine will lift in excess of 1100 lb and cruises at more than 100 mph. Last month the R-5 flew from Dayton to Boston nonstop, establishing a new record for helicopter long-distance flight.*

CPA Moves to Aid Copper Mines; Considers Industry Allocation Program

By GENE HARDY

Washington

• • • **Faced with a** critical shortage of copper and copper products, CPA is considering a plan to allocate copper to urgently needed end-products, similar to the self-certification program recently invoked for steel products.

The agency also contemplates granting priorities, under PR 28, for capital goods, construction, and maintenance and repair supplies to step up output of ores, all primary copper, refinery shapes, ingots, castings, brass mill products and wire mill products. Finally, the Commerce Department will be asked to tighten its system of export licenses and the RFC will be requested to get underway an expanded program of foreign purchase contracts. The foreign purchase program must await passage of the OPA extension bill, including the copper subsidy program, since no contracts can be signed until legislative action has been completed. CPA has also requested copper fabricators to file production reports. This reporting was discontinued at the end of last year.

Harassed by strikes in the mines, smelters and refineries for the past six months, the copper supply situation has become so critical that CPA says it may result in the complete shutdown of consuming plant operations within a very short time. Backlogs of orders for wire and brass mill products are so huge that it is impossible to say when shipments will be made.

All of industry is being troubled by the copper shortage. Shipments of otherwise completed household appliances are being held up due to the lack of copper wire and other products. Wire and cable manufacturers have been the hardest hit, with producers of electric motors and transformers running a close second.

Primary production is most critical. Domestic mines are now yielding about 33 pct of the average monthly output during the last six months of 1945. Mine and smelter production has dropped from a monthly average of 66,000 tons during the last half of 1945 to 40,800 tons in March, 29,300 tons in April, and 31,700 tons in May. Refinery production from domestic ores is approximately 29 pct of the average monthly output during the last half of 1945. Output during April amounted to approximately 19,000 tons compared with 20,000 in March, 50,000 in February and 69,000 in January. If all facilities were operating, CPA estimates that domestic production would be approximately 70,000 tons a month, with demand greatly in excess of this amount.

The situation is becoming more critical daily. Mine and smelter production has dropped 60 pct; refineries, 80 pct; brass mill production, 12 pct; and copper wire mills, 5 pct. The demand on the wire and brass mills for material for veterans housing adds to the difficulties.

Only in the foundries is the picture just a little less black, but even here difficulties are encountered in obtaining sufficient scrap and ingot for operation.

During recent months wire mills and brass mills have been using the Metals Reserve Co. stockpile as their primary source of supply. But, as CPA points out, this heavy drain cannot continue indefinitely.

The MRC stockpile of refined copper has declined from 499,800 tons at the end of last year to 306,000 tons as of May 31, 1946. Authorized withdrawals from the stockpile for the second quarter were set at 232,500 tons; 70,500 tons in April; 80,000 tons in May; and 82,000 tons in June. MRC stocks of copper are now deficient in particular shapes, such as wire bars, which are now in greatest demand.

The outlook for replenishing stocks is gloomy. At the end of May about 46,000 tons of electrolytic copper were in process, but all of this, except 12,000 tons, was in plants tied up by strikes.

Imports will remain at practically zero levels until new contracts are signed after the OPA bill is passed. All outstanding contracts for foreign copper were cancelled on Oct. 31, 1945. However, a new Public Purchase Program was inaugurated for the first half of 1946 calling for the purchase of 120,000 tons of foreign copper. Due to the difficulty in obtaining firm contracts RFC was only able to complete contracts for about 90,000 tons. Labor troubles in Chile further complicate the foreign supply situation.

When the domestic labor strife is cleared up American producers will also find themselves faced with a shortage of timber needed for underground mining. Development work, neglected during the war,

SIGNS OF THE TIMES: *Members of the First Special Marine Regiment hit the Puerto Rico beach in a practice invasion landing during 8th Fleet maneuvers off the eastern end of the island.*

will also have to be intensified if maximum production is to be realized.

Exports of refinery shapes increased from 15,800 tons in the last quarter of 1945 to 19,200 tons in the first quarter of this year. Exports of wire mill products remained constant at about 16 million lb during the first quarter as compared with the last quarter of 1945. Brass mill products were also exported during the first quarter at a rate comparable to that of the last quarter of 1945, approximately 5 million lb.

Pittsburgh Group Forms New Tool Making Firm

Pittsburgh

• • • **The National** Precision Tool Co., a new corporation, has recently been formed with offices at 335 Fifth Ave., Pittsburgh.

The officers of the corporation are John B. Sutton, Jr., president; Alfred E. Ward, vice-president and treasurer; and James G. Marks, Jr., secretary. The machinery, equipment and inventory of Precision Threads, formerly owned by Walter B. Wendt, have been purchased and operations are in progress.

Mr. Wendt has been retained as shop superintendent and Paul H. Wendt as assistant shop superintendent. The company is also in a position to handle general machine work on small parts.

Tin Supply Prospects Appear Gloomy Until The End of Next Year

Washington

• • • **Continuation in** effect of General Preference Order M-43, which provides for allocation of pig tin as well as restricting the tin content of various products, appears certain to remain in effect for a number of months to come.

This is the conclusion to be drawn from the CPA production report for May which presents a gloomy outlook for tin users for the remainder of 1946 and at least the early part of 1947. The agency's latest estimate for the new supply of tin in both metal and concentrates for the United States during 1946 is estimated at 42,000 long tons against the year's restricted requirements of 65,000 tons.

In order to make up the difference for essential needs, it will be necessary to draw from the government's stockpile at the rate of 2000 tons a month. When this is considered with such factors as the earmarking of 18,000 tons of ore stocks for the government-owned smelter and the freezing of 12,000 tons of pig tin in the Teasury-Navy Reserve, it is indicated that the net reserve stocks may be reduced to as little as 15,000 tons by the end of the year.

In view of the tremendous backlogs of orders for such consumer durables as automobiles, refrigerators, radios, telephones and many others, much more tin will be absorbed this year despite the greatly reduced take for military uses. It is expected that international allocations will have to be retained and export controls will also remain in force.

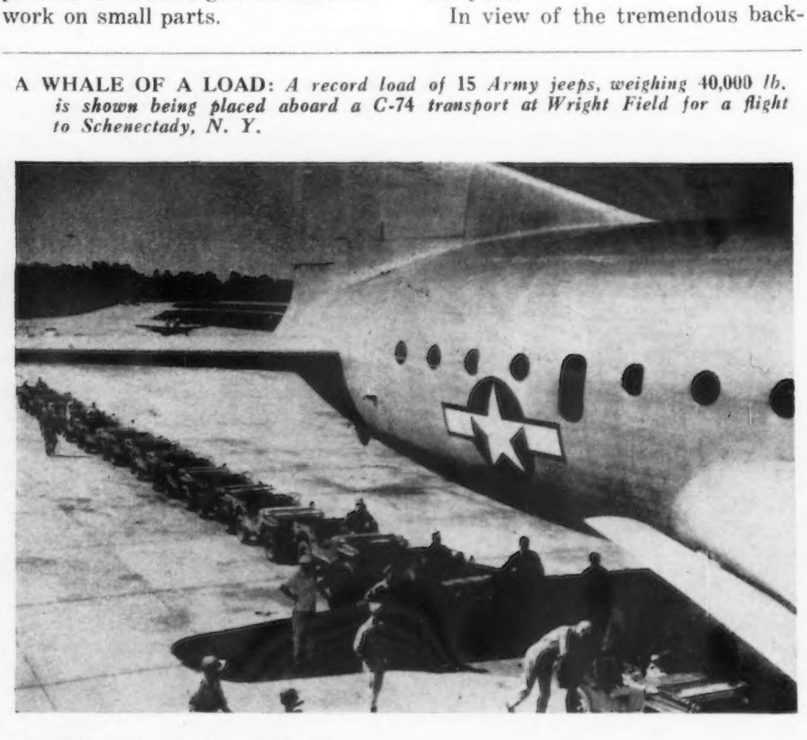
It is hoped that the declining trend in tin stocks, which began in 1941 when the United States lost access to Malaya and the East Indies, can be halted. Since that time, the principal sources have been Bolivia and the Belgian Congo. It is now forecast that imports may amount to as much as 15,000 tons in concentrates for the first half of 1946 — some 11,000 tons from Bolivia and the remainder from Belgian Congo.

In addition, it is expected that about 6,800 tons will be allotted the United States by the Combined Tin Committee from supplies in the Far East. Most of this supply, however, comes from recovered stocks and the outlook for new concentrate production is not good. Even the proposed elimination of primary smelting activity in Japan helps but little since Japanese production was only about 11,000 tons and a probably 3,000 tons will have to be allocated for bare needs of that nation.

A large part of America's supply has come from secondary sources. While receipts of alloy scrap held up well last year, recovery of secondary pig tin declined 22 pct, largely because of lighter coatings on cans and falling salvage collections

Officially, in view of the present situation, little hope is held for supply to approach demand much before late 1947.

A WHALE OF A LOAD: *A record load of* 15 *Army jeeps, weighing* 40,000 *lb. is shown being placed aboard a C-74 transport at Wright Field for a flight to Schenectady, N. Y.*



Britain Takes Mines Jan. 1

London

• • • **British coal** mines will be taken over by the State on Jan. 1 next if, as expected, the nationalization bill goes through Parliament in July. Lord Hyndley, chairman-designate of the National Coal Board, made this announcement following a 6-week tour of British coal fields.

He said that the country would be divided into eight divisions. Each division would have a chairman together with marketing, production, labor, and financial directors.

USES Survey Shows Employment of Vets Has Increased 5 Pct

Pittsburgh

• • • **Based on** a survey of firms employing a total of 145,000 workers, it was found by the U. S. Employment Service that 26 pct of the men working in this area are World War II veterans, up 5 pct in two months. This survey also revealed that 28,000 veterans are unemployed and are looking for work.

USES has asked industrial concerns in the area to list all job openings with the Service to give veterans a chance for readjustment into civilian life. With industry gradually recovering from the effects of the coal strike it is expected that the demand for workers will increase sharply in the next two months. The survey showed that materials shortages will probably be relieved somewhat during that period, helping to account for the increased personnel demand. Despite industrial unrest and material shortages, firms employing 145,000 workers maintained their total employment during the past two months. A net increase of about 1500 men to the employment rolls, however, was offset by a decrease of about 1400 women workers.

The peak period for unemployment compensation was the week ending May 24, when 15,700 compensation checks were signed. For the week ending June 13, this number declined to 12,800. However, 21,000 World War II veterans signed for servicemen's readjustment allowances payments during the week ending June 13, up from 16,600 at the end of May.

The USES reports that a shortage of skilled workers is developing in Pittsburgh and the housing situation may impede out-of-area recruitment. In the building trades, carpenters, plumbers, painters, plasterers and electricians are scarce. Machinists, pattern makers, auto mechanics, body and fender men, mill furnace repairmen and maintenance men, as well as many workers for specific clerical jobs are in demand at the USES.

With 36,000 unemployed (28,000 World War II veterans) registered at the Pittsburgh USES, the Service lists many trades, professions and skills that are available to Pittsburgh employers. It also points out that 5000 additional high school graduates will be ready for jobs in June.

Drop Forging Assn. Elects New Officers At Chicago Meeting

Chicago

• • • **At the 11th annual meeting** of the Drop Forging Assn held at the Edgewater Beach Hotel, Chicago, June 14-15, the following directors and officers were elected: president-Roland J. Ahern, president of the Billings & Spencer Co., Hartford; vice-president—Ralph A. Mitchell, vice-president of Pittsburgh Forgings Co., Coraopolis, Pa.; directors—L. M. Fehrenbach, vice-president and general manager of Indianapolis Drop Forging Co., Indianapolis; R. B. Tripp, vice-president of Ohio Forge and Machine Corp., Cleveland; R. Robert Smith, president of Milwaukee Forge & Machine Co., Milwaukee; Barney C. Cox, president and general manager of Melling Forging Co., Lansing, Mich.; Elmer W. Cross, vice-president and treasurer of Buchanan Steel Products Corp., Buchanan, Mich.

Also elected as directors were: K. E. Walter, president of The Alliance Drop Forging Co., Alliance, Ohio; W. O. English, manager Forge Division of the National Lock Washer Co., Newark, N. J.; Walter S. Story, vice-president and general manager of Maine Steel, Inc., South Portland, Maine; and Raymond D. Moore, general sales manager of St. Pierre Chain Corp., Worcester.

Mr. R. M. Seabury, who has had a continuous term of 11 yr as secretary-treasurer, was reelected, and Mr. Holloway Kilborn was reelected assistant secretary-treasurer. This association represents the interests of the Commercial Drop Forging industry, one of the oldest groups of metal fabricators in the United States.

Iron Ore Output Drops

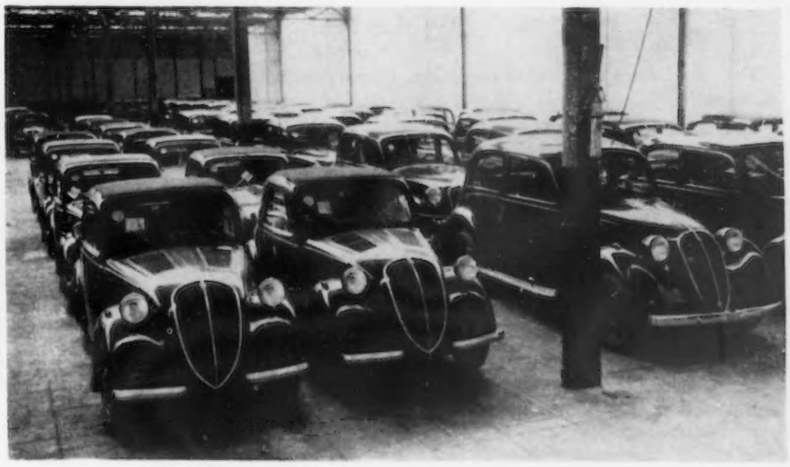
Cleveland

• • • **Indicative of** the curtailment of steelmaking operations caused by the coal and railroad strikes, consumption of Lake Superior district iron ore during May dropped to 2,990,189 gross tons, compared with 4,768,718 tons in April and 6,872,461 tons in May 1945, according to the monthly report of the Lake Superior Iron Ore Assn.

The association's report showed 76 United States and six Canadian furnaces in blast June 1, of a total of 195 depending primarily on Lake Superior district iron ore. On May 1, United States blast furnaces in operation totaled 108 and six Canadian. On June 1, 1945, 164 United States and seven Canadian furnaces were in blast.

Ore stocks at furnaces and Lake Erie docks on June 1 totaled 23,904,998 gross tons, compared with 20,714,738 gross tons on hand June 1, 1945, according to the report.

FRENCH CARS FOR FOREIGNERS: *Average day's output of the Simca plant near Paris is 40 to 50 cars. The model at right is for export; 85 pct of the type shown to the left are also exported.*



New Steel Mill Seen Added To Group Feeding Kaiser-Frazer Steel Sheets

New York

• • • **Reports that the** Andrews Steel Co. or the facilities of the former Newport Rolling Mill Co., Newport, Ky., will be absorbed by the Kaiser-Frazer group or its associates, have been denied by Charles H. Stamm, president, Andrews Steel Co. These reports apparently grew out of the fact that Kaiser steel interests had made an application for a freight rate on pig iron from Fontana to Wilder, Ky., a rail point of Andrews Steel Co.

The application to the railroad carriers' rate committee asks for a tariff of $13.70 per gross ton on pig iron from Fontana to Wilder for a 6-months period. The Andrews plant has no pig iron capacity but has seven openhearth furnaces capable of producing 413,000 tons of steel ingots annually.

Kaiser interests have been seeking new sources for sheet steel to the extent of supplying ingots or sheet bars or both. The latest deal with the Andrews company, it is known, involves a single transaction whereby the Kaiser steel company will furnish pig iron and will obtain a stipulated tonnage of cold-rolled sheets. Andrews, it is understood, is badly in need of pig iron supplies and has agreed to a conversion proposition which will extend to Aug. 10. Whether or not an additional commitment will be made at the conclusion of this one remains to be seen.

A recent application for a special freight rate of $17.44 per gross ton on shipments of ingots from Kaiser's Fontana plant to Detroit, where they presumably will be rolled into sheets at Great Lakes Steel Corp., is understood to be still under debate by the railroads. The carriers' joint rate committee is reported to have countered the original application with a suggested $20.16 rate, later trimming to $17.80. The latter rate still must be approved by the individual western railroads over which the movement is made and by the eastern roads.

Traffic departments of other steel shippers are watching carefully what action is taken on these applications. If the railroads substantially approve the requested rates, far lower than those governing many steel movements over comparable distances, a flood of applications for reduction of steel tariffs may be unloosed.

Coming Events

Sept. 10-14 American Chemical Society, exposition, Chicago.

Sept. 11-12 Society of Automotive Engineers, national tractor meeting, Milwaukee.

Sept. 16-20 Instrument Society of America, first conference and exhibit, Pittsburgh.

Oct. 1-4 Iron & Steel Exposition, Cleveland Public Auditorium, Cleveland.

Oct. 3-5 National Electronic Conference, Chicago.

Oct. 3-5 Society of Automotive Engineers, aeronautic meeting and display, Los Angeles.

Oct. 24 American Welding Society, New York.

Oct. 28-30 American Gear Manufacturers Assn., semi-annual meeting, Chicago.

Oct. 29-Nov. 1. Refrigerator Equipment Manufacturers Assn., exposition, Cleveland.

Nov. 7-8 National Founders Assn., New York.

Nov. 18-22 National Metal Congress and Exposition, annual meeting, Atlantic City, N. J.

Suspension of Control On Capital, Producers' Goods Expected Soon

Washington

• • • **A sweeping order** which would suspend price controls from virtually all capital and producers' goods has been prepared for signature of OPA Administrator Paul A. Porter, according to reliable sources within the price agency.

Formulated some weeks ago and held in abeyance pending final action on OPA legislation, the order will not be dated and issued until the controversial control legislation is settled, it is understood.

In the meantime, another decontrol order, sufficiently broad as to suspend price ceilings from an estimated $2 billion worth of industrial machinery and related products, will be announced this week or next at the latest, the same officials said.

Second in scope only to the Apr. 8 order (affecting $3 billion worth), this latter order amending SO-129 will apply broadly to the following major lines, none of which would seriously affect cost of living and in which buyers are considered in reasonably good position to resist an unwarranted price rise:

a. Mining and related machinery such as shuttle cars, mine loaders, pulverizers, etc.

b. Machine tools such as drills and grinders, turret and special purpose lathes, automatic milling and chucking machines, etc.

c. Specified petroleum drilling and other oil production machinery and equipment.

d. Specified agricultural equipment and supplies of the poultry-raising and bee-keeping types.

e. Specified electrical equipment of the arc lamp, flood lighting, highway lighting and traffic light classes.

f. Automatic testing and maintenance equipment such as alignment machines, brake drum gages, and similar equipment.

Although this second order does not hinge upon pending legislation, it is possible that it may be superseded by the broader order should the fate of OPA be decided earlier than now anticipated.

Weekly Gallup Polls . . .

Majority Favors Legislation to Enforce Industrial Peace

Princeton, N. J.

• • • **With the question** of labor legislation dominating public thought, one fact stands out: a substantial segment of the American people are willing to support extreme measures in order to win industrial peace, according to George Gallup, director, American Institute of Public Opinion.

Although the president's proposal to draft workers into the Army if they refused to return to work in a government-seized essential industry brought a storm of opposition on his head from both extreme liberals and conservatives, among the American voters polled, slightly more favor the idea than oppose it.

An earlier preliminary check of opinion, taken by telegraph across the nation, immediately after the President first offered the proposal, showed a higher vote in favor of it than is found in the present, follow-up poll taken after the idea had been more widely discussed.

The telegraphic survey showed a slight majority voting approval of the proposal. Today, while the vote of approval falls short of a majority, the preponderant number among the voters interviewed continues in favor of the idea.

The question in both surveys:

"President Truman has proposed that employers and employees who refuse to run strike-bound essential industries taken over by the government be drafted into the armed forced and sent back to their jobs. Do you approve or disapprove of this?"

	Present Poll Pct	Telegraphic Survey Pct
Approve	47	53
Disapprove	43	38
No opinion	10	9

Although a substantial majority of union members are found opposed to the proposal, the ranks of labor show some division on the issue.

Six out of ten oppose the idea, but three out of ten say they favor the idea of drafting workers if need be, while one out of ten has no opinion.

While opinion is fairly evenly divided on the specific proposal of drafting employers and employees, it would be a mistake to assume that the great majority of Americans are not in favor of some steps to compel workers to return to their jobs in government-seized struck industries.

A large majority are found favoring the principle of compulsion in cases where the industry is considered essential.

The question asked in this connection:

"President Truman has proposed that employers and employees be compelled to run strike-bound essential industries which the government has taken over. In general, do you approve or disapprove of this?"

	Present Poll Pct	Telegraphic Survey Pct
Approve	61	65
Disapprove	28	26
No opinion	11	9

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• • • **Gen. Douglas MacArthur,** Gen. Dwight D. Eisenhower, and President Truman are the three men most admired by the people of the United States today.

In a coast to coast survey by the institute people in all walks of life were asked, "What person living today in any part of the world do you admire most?" The following are the top ten choices. The names are listed in order of frequency of mention.

(1) Gen. Douglas MacArthur
(2) Gen. Dwight D. Eisenhower
(3) President Harry S. Truman
(4) Mrs. Franklin D. Roosevelt
(5) Winston Churchill
(6) Former President Herbert Hoover
(7) Henry A. Wallace, Secretary of Commerce and former Vice-President
(8) Gov. Thomas E. Dewey of New York
(9) Harold E. Stassen, ex-governor of Minnesota and former captain in the Navy
(10) James F. Byrnes, Secretary of State

More than 400 different names were mentioned by voters in the survey.

But Poll Indicates Support Of President's Proposal to Draft Strikers Has Only Slight Lead

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The list of the top ten is interesting for the types of leaders not mentioned. There are no movie or radio stars among the top ten most admired people, no businessmen, no labor leaders, no sports figures, no religious leaders, no writers, educators or scientists. While some observers say the country is moving leftward, many of the ten most admired people would be classed generally as conservatives.

The top two are military leaders; the rest are figures in political life.

Names most prominently mentioned after the top ten are Pope Pius; Cordell Hull, former Secretary of State; Senator Arthur H. Vandenberg of Michigan; Bernard Baruch, presidential adviser; General Jonathan M. Wainright, hero of the Philippine war; Walter Winchell, columnist; Edward Stettinius, Jr., former Secretary of State and first U. N. delegate from the United States; Henry Ford; Joseph Stalin, and Fiorello LaGuardia, director of UNRRA.

Among the men polled, the five most admired leaders are: MacArthur, Eisenhower, Truman, Churchill and Hoover.

Questioning among women revealed the following to be their most admired heroes: MacArthur, Eisenhower, Truman, Mrs. Roosevelt and Churchill.

Among veterans of World War II, Eisenhower outpolls MacArthur in admiration. The vote of vets: Eisenhower, MacArthur, Truman, Churchill and Hoover.

In addition to the leaders named above, the following people in various professions received prominent mention by voters in the poll:

Military or Naval Leaders: Gen. George C. Marshall; Admiral Chester Nimitz; Admiral W. F. Halsey;

(CONTINUED ON PAGE 148)

Farm Equipment Production Picture Still Clouded by Strikes and Shortages

Chicago

• • • **Farm equipment production** remains behind schedule and far short of the demand with no immediate relief in view.

Three producers of this type of machinery are still plagued with strikes. Threatened government seizure of the plants of two strike-ridden companies will do little to speed production as the industry in general is suffering from a component parts shortage in certain critical items.

International Harvester recovered to nearly 100 pct production in the first month since the settlement of its protracted strike and has continued to hold this pace. Oliver Corp. and Deere & Co. will get back to production levels attained before the coal and steel strikes during June but their production will still be considerably off the pace planned for 1946. Other farm equipment producers are putting up a fierce struggle to keep in operation and are actually on a hand-to-mouth basis on certain critical parts. The full impact of the coal and steel strike has not yet been fully felt so that the next 30 to 90 days will bring the real crisis.

Strikes at seven Allis-Chalmers plants, Minneapolis-Moline and the Racine and Rockford plants of J. I. Case Co. have adversely affected production of badly needed equipment. The Case and Allis-Chalmers plants have been threatened with government seizure for some time; however, the Minneapolis-Moline plants are not involved in seizure talk at the moment. Government seizure of these plants, which has been imminent for the past two or three weeks, would do little to help production.

Resumption of an adequate flow of farm machinery is dependent on many component part makers. One producer has 35 such sources tied up by strikes. Should government seizure of these plants take place immediately, production would still be wholly dependent upon the flow of material and parts from other industries, many of which have had long and serious strikes of their own. Some producers report that they have on their production lines many machines that are only partially finished and are being held until the needed parts arrive. One of the serious shortages is in radiators for the power plants of the machines.

The scarcity of certain flat rolled products is also another bottleneck, particularly that of galvanized sheets. Light structurals and malleable iron castings are conspicuous by their absence. Decisions on the part of the producers to discontinue certain unprofitable items because of price or freight rates offers little hope of immediate relief on much of the sorely needed raw materials.

The recent self certification priority system granted by CPA is not counted on to speed materially the delivery of raw materials into the farm machinery manufacturing plants. This priority was not a blanket across-the-board order on all types of machinery, but was restricted primarily to harvesting equipment. The CPA priority ruling did not increase the quota allocated to the different manufacturers. Rather it merely insured the manufacturer that he would receive material already on the books, as confirmed orders from the producers. The deliveries of such materials are still dependent upon the rate at which the producers can get back into full production so that the immediate needs of the machinery makers are still not being met.

FLYING FARMERS: *This is the Ames, Iowa, airport where farmers parked* 125 *planes while they attended a program at Iowa State College. Normally, farmers buy about half a billion dollars worth of farm equipment a year; strikes and shortages have cut the rate to date.*

English Firm Reports Tube Exports Increased

London

• • • **A. G. Stewart,** chairman of Stewart & Lloyds, British steel firm, stated recently that his firm's exports of tubes for the first three months of 1946 exceeded the average for the years 1937 to 1939. Although the figures were affected to some extent by lack of shipping and transportation they were at the rate of 259,000 tons per annum as compared with an annual average of 204,000 tons for the prewar years 1937 to 1939.

In disclosing these figures at the company's annual meeting, Mr. Stewart stated that the company had developed a steel roof truss which is being used in a permanent house designed by the British Iron and Steel Federation which is now coming into production. The company has on hand orders for roof trusses for 41,000 temporary and 30,000 permanent houses, involving more than 17 million ft of tubing.

French Study Purchase From U. S. of Two Continuous Strip Mills

Paris

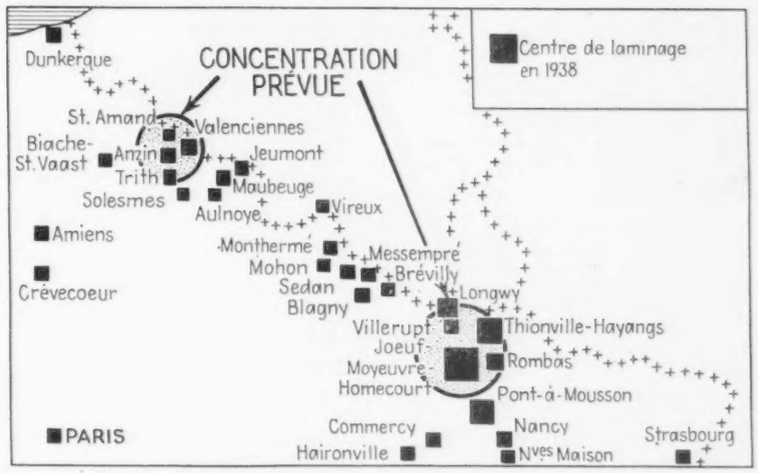
• • • **Following the** announcements by Mr. Leon Blum on the outcome of the American loan negotiations, there has been an upturn of interest in the possibility of purchasing a continuous strip mill for France. The studies are well advanced and American producers and technicians have been consulted. The erection of two continuous strip mills, each with a capacity of 450,000 metric tons (495,000 net tons) in the initial stages is considered reasonable to meet the immediate demand for flat-rolled products. It is recognized that most of the machinery must be imported from the United States.

Discussions are still going on to determine the proper sites for these plants. Many separate interests are involved, and all of the usual factors of raw material supply, manpower and the location of consumers are under consideration. Present plans call for one to be built in the North district, important consuming center on the coal fields, and the other in the East district near the Lorraine ore fields. In the first stages they will be supplied with steel from existing plants, as the construction of new blast furnaces and steel melting shops is doubtful at the moment.

The map shows the position of existing rolling mills in France and the districts proposed for the construction of the new strip mills. It seems that the Denian-Anzin area and the Thionville-Hayange district would be generally suitable, as there is ample ingot production at these locations.

With these two strip mills the French iron and steel industry would be able to satisfy domestic demand for sheet and strip as well as tinplate. Manufacture of this type of product was around one million tons between 1929 and 1939, and, taking into account the existing mills which would be maintained, the capacity of the new strip mills would be sufficient to meet the anticipated increased demand of the postwar period.

This plan will require the elimination of the obsolete mills, and negotiations have been started to this end. It is one of the main difficulties of the completion of this plan which from the technical and economic point of view is justified. There are about 400 rolling mills for plates, light plates, sheets and thin sheets in France, of which 30 are for light plates and sheets and 48 for thin sheets.



FRENCH STRIP MILLS: ***Probable locations of two contemplated continuous strip mills to be bought by France are indicated by the circles on the above map. The prewar concentrations of rolling mills are indicated by squares.***

An important number will be closed if and when the modern continuous strip mills are put into operation. Many towns and villages would be affected by the transfer of production and of some of the workers. The owners are to be paid at a rate set by voluntary agreement, or if no voluntary agreement can be reached the indemnity will be fixed by arbitration.

Decisions are likely to be taken soon now that the French elections are over, and the announcement made recently in the British House of Commons outlining the modernization and development plans of the British Iron & Steel Federation will perhaps accelerate the French plans.

Electro-Met Purchases Ohio Ferrosilicon Plant

Washington

• • • **The Electro Metallurgical** Co., New York, has purchased for $5,050,000 the ferrosilicon and calcium carbide plant it operated during the war at Ashtabula, Ohio. WAA reported that the property, which was built and equipped by the Federal Government at a cost of $8,353,634, has a present-day fair value of $4,616,501 and was bought by Electro Metallurgical Co. for 98 pct of this fair value, or $4,530,000, the remaining $520,000 of the purchase figure covering plant inventories which were bought at 80 pct of their book value.

Electro Metallurgical proposes to expend $9 million for the installation of a power plant and a dust and fumes control system. Employment is expected to reach 700 persons, apart from the construction workers required. The property will become formally surplus by June 30.

WAA also announced that Batavia Metals Products, a subsidiary of the Hercules Mfg. Co., Batavia, Ill., has leased certain scrambled facilities the parent company operated at Centerville, Iowa. The latter equipment will be operated in combination with solely owned facilities of the Hercules Co. in production of gray iron castings.

Annual rental will be $9600, over 10 pct of the fair value of the leased facilities, $93,190. During the war the Centerville plant turned out 4250 tons of finished steel castings per yr for the military program. The present Hercules-Batavia Metals work roster will be increased by 50 employees.

Continuing Coal Shortage Threatens

Dr. A. C. Fieldner reports on the Bureau of Mines coal and coking studies.

Absecon, N. J.

• • • **The supply of coking** coal at plants of byproduct coke producers was reported to average less than 10 days' supply at the first annual meeting of the American By-Product Coke Institute here June 17 and 18. However, coal was said to be coming out of mines in tremendous quantities since the end of the strike. This was not expected to continue long, however, because of the practice of coal miners to lay off several days a week, once they have reserve funds.

This coupled with inadequate reserves of low volatile coking coals, made it the consensus that there was no possibility for the production of sufficient coke to operate all U. S. blast furnaces. This situation was predicted to continue at least until next April and perhaps much longer. One of the significant problems of the industry is said to be a continuation of the poor quality of coking coals which were produced during the war. It was stated that only 60 pct of the mines have coal cleaning plants in operation.

Dexter Tutein, chief of the basic materials section of OPA, stated at the meeting that U. S. steel and foundry requirements would be 700,000 tons of pig iron per month and in that connection the government was expected to encourage the operation of bee hive ovens. He said that there was a tremendous demand for the export of pig iron but that applications for export licenses had been returned for submittal at a later date when the supply position had improved. In discussing foreign coking developments, Mr. Tutein said that Canada will require coke producers to supply domestic solid fuel requirements at the expense of the Canadian steel industry. He also pointed to the fact that Russia's 5-yr program in the steel industry contemplated 63 coke oven batteries, each consisting of 65 ovens.

Observers at the meeting estimated that there was to be a 25 to 35 pct expansion in gray iron foundry plant during the next few years and conservatively estimated foundry coke consumption to reach 2 to 3 million tons per yr. In that connection it was recognized that coke sales are built around the production of a low ash fuel. This factor of quality could not be adhered to strictly during the war because of the poor quality of coal received by coke producers. It was therefore suggested that a greater measure of cooperation between producers of solid fuels, i.e. bituminous, anthracite and coke, was desirable to promote consumer acceptance.

It was apparent in the discussion that the economic background of the industry was dependent upon the sale of byproducts, and principally the sale of gas to utilities. A primary threat to the industry which has served to jeopardize the establishment of additional facilities for the production of foundry and blast furnace coke and even the full utilization of existing coke plant facilities has been the increasingly wider distribution of natural gas. This trend has already resulted in the closing down of certain byproduct coke facilities. This situation cannot be improved by an increase in coke prices, it was said, for already wartime increases tied in with those granted coal and pig iron have placed the product at a competitive disadvantage.

The meeting was largely taken up with research activities under way and contemplated by the industry, the Bureau of Mines, fuels and explosives branch, Bituminous Coal Research, Inc. of the National Coal Assn., and the Institute of Gas Technology. One of the principal needs for technological development in the industry is coke oven development, said not to have been significantly improved since early byproduct ovens. Such improvements could be made by working out better control of byproduct output so as to provide flexibility for changing market conditions and to permit maximum upgrading of byproducts.

In analyzing the significance and impact of research activities on the byproduct coke industry, Dan M. Rugg, vice-president of Koppers Co. Inc., laid emphasis on the work under way by the Bureau of Mines. Its survey of gas, coke and byproducts, designed to foster increased pig iron production, is being aided by the preparation of a list of complete analyses of U. S. coals and the development of test methods for sampling coal. There is also a project under way to promote the use of natural gas at its point of production for the recovery of chemicals and byproducts, which would serve to permit increased sale of gas to utilities by coke plants. Other projects are the complete gasification of coal, and the increased sale of water gas to utilities. Research into hydrogen recovery is under way to supplement the sale of gas as fuel, and a study of possibilities for upgrading of byproducts.

An important part of the research program of the fuels and explosives section of the Bureau of Mines, it was stated by Dr. A. C. Fieldner, chief, is directed toward obtaining fundamental facts on the chemical and physical properties of U. S. coal resources ranging from peat to anthracite. Postwar problems keynote the 1946 program of technological investigations into more efficient methods of mining, preparation and utilization of coal and lignite.

The probable decline in the discovery of new petroleum reserves may require an important synthetic liquid fuel industry within the next two decades, Dr. Fieldner said. Development of a process for making such fuels at low cost from natural gas costing not more than 5¢ per thousand cu ft may render it uneconomical to build long distance pipelines between Texas and the east. If the cost of oxygen production can be lowered materially.

Byproduct Coke and Pig Iron Supply

C. A. Reed reports on pure and applied research of Bituminous Coal Research, Inc.

o o o

By JOHN ANTHONY

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it may be possible to gasify coal completely with the aid of oxygen according to Dr. Fieldner. Such gas from Appalachian coal fields could be blended with natural gas to increase the supply. Research is in progress on the gasification of powdered coal, and Russian experiments on underground gasification may lead to similar U. S. investigation.

The smoke abatement activity of some communities restricts the burning of high volatile bituminous coal in domestic furnaces to mechanical stokers which offer virtually smokeless combustion. In the absence of such stokers permitted fuels have been limited to gas, oil, coke, anthracite and low volatile coal. If smoke abatement projects increase, it may compel the coking of coal at high or low temperatures to provide smokeless solid fuels, according to Dr. Fieldner.

In the Bureau survey of the composition of U. S. coals, samples are crushed at the mines for shipment in moisture tight containers to the coal analysis laboratory at the Pittsburgh Experiment Station. There they are subject to proximate and ultimate analyses, determinations of ash fusion temperatures and calorific values and, in special cases, agglomerating, weathering, caking, grindability and friability tests are made.

One of the fundamental methods of studying the origin and constitution of coal consists of microscopic examinations in thin sections or polished and etched surfaces. A systematic microscopic examination and petrographic analysis of vertical sections of coal beds are taken for carbonization studies which have been helpful in explaining variations in the coking qualities of coals not evident from a chemical analysis. Petrographic analysis is also found helpful in estimating the suitability of a coal to hydrogenation and liquefaction by the Bergius process.

Among the most important properties of coals from the standpoint of the coke operator, Dr. Fieldner said, are plastic and swelling characteristics on heating. When a coking coal is heated at a moderate rate in the absence of air it gradually softens, coalesces and expands, giving off gases and vapors, followed by hardening to form a cellular structure. Coals show marked differences in the degree of plastic and expansion characteristics. Plasticity studies, according to Dr. Fieldner, should be helpful in proportioning coal blends to assure optimum properties and to avoid expansion characteristics detrimental to the oven structure. Also, in determining the effect of oxidation of coal incident to storage on the coking properties of coal. Such tests also promise usefulness in determining the caking tendencies of coals in stokers, gas producers and water gas machines.

During the war Bureau engineers supervised exploration of coal deposits to determine reserves where there were shortages, as in Alaska, Washington and Oregon; and also where coking coals were needed, as in Utah, New Mexico and Colorado. Exploration in western Colorado, the Georges Creek Field, Md., and the Coosa Field of Alabama are now in progress.

Current research on combustion, fuel burning equipment and fuel economy relates to the clinkering and slagging actions of coal ash, especially with reference to the flow characteristics of coal ash slags on the heat absorbing surfaces of large boiler furnaces.

Chester A. Reed, engineering director of the National Coal Assn., reported on projects of pure and applied research which have been under way for several years in their laboratories. These include studies on the complete carbonization of pulverized coal, basic studies of gasification reaction, heat transfer into coal which includes coke oven heating, the development of tests for physical control of coke, determinations of coke quality from tests, the reactivity of solid fuels with air and with oxygen, the combustion behavior of individual fine particles of coal, variation of properties in micron sized coal, changes in rates of preheating such as to change the relative rates of tar and gas extraction, studies indicating the changes in lateral thrust pressure in coke ovens due to rate of heating, studying the heat of carbonization as well as the sensible heat of the fuel being burned.

According to Mr. Reed the manufactured gas industry appears to need a method of complete gasification without the necessity of the two-step process of carbonization and water gas manufacture now used. At present a utility is constantly faced with the problem of balancing its production and markets for two fuels which are to some degree competitive. If a one step process of high capacity and low cost could be developed and adopted, it would help the merchant coke branch of the industry and this investigation is now being carried on. Bituminous Coal Research Inc. is also studying the treatment of coal for the direct release of chemicals, and controlled treatment for soil improvement by the addition of coal.

Captain E. S. Pettyjohn, director of the Institute of Gas Technology, described the research activities of this group.

The officers and directors were all re-elected at the meeting. Officers and directors are as follows: Leigh Willard, president; P. H. Neal, treasurer and assistant secretary; W. H. Earle, vice-president; Alfred Hirsh, secretary and assistant treasurer; and Samuel Weiss, executive secretary. Directors, A. W. Conover, Thomas L. Kemp, W. Reed Morris, D. G. Munroe, J. T. Whiting, W. H. Earle, Alfred Hirsh, J. A. B. Lovett, P. S. Savage, Leigh Willard, A. M. Beebee, R. M. Marshall, P. H. Neal, S. S. Robinson, and R. P. Tibolt.

Steel Earnings Drop To 4.89 Pct on Investment

New York

• • • **Steel companies'** earnings, declining year by year since 1941, dropped last year to the lowest point since 1939. Only 4.89 pct was earned on investment in 1945, in contrast with 7.53 pct earned in 1940 and 6.18 pct in 1937.

Steel companies accounting for approximately 91 pct of the industry's production of ingots had a combined net income of $179,653,000 in 1945 after meeting all charges but before paying dividends. This was 36 pct lower than in 1940. In 1944, the greatest production year on record, the same companies' earnings were nearly identical—$179,834,000.

Although steel production was 19 pct higher last year than in 1940, dividend payments totaled only $137,796,000, slightly lower than in 1940. At the same time the industry's wage and salary payments of $2,282,371,000 were nearly double the total 1940 payroll.

Payrolls in 1945 were 16.6 times greater than dividends last year. For every dollar paid to employees, stockholders received 6¢ in dividends. In 1940 dividends were equal to 11.7¢ for each dollar going into payrolls.

Contrasted with 4.89 pct earned on investment in 1945, earnings in 1941 were 8.1 pct on investment, which compared with 5.6 pct in 1942, 5.1 pct in 1943, and 6.2 pct in 1937. In 1944 the figure was 4.70 pct.

A total of $5,764,295,000 in gross income was received by the steel companies in 1945, including income from their non-steelmaking activities. That total represented a decline of about $825,889,000 from 1944 income.

The industry's earnings record in 1929 represented a return of 9.1 pct on the amount of its investment, while earnings in 1940 represented a return of 7.5 pct. From 1930 to 1939, the industry earned an average of only 1.8 pct on its investment.

Lifts Quota Controls On Use of 30-Lb Tins

Washington

• • • **Removal of all** quota restrictions on the use of 30-lb capacity tin containers for packaging frozen food and modification of restrictions on small users of containers was announced on June 20 by OPA. These changes were effected through an amendment to container order M-81.

Previously, hot pack processors of fruits and vegetables had been permitted unlimited use of hermetically sealed cans. Under the amended order this unlimited privilege has now been extended to processors of frozen fruits and vegetables in 10-lb cans. The latter group had previously been limited in the use of 30-lb cans to 100 pct of the corresponding 1944 pack of frozen cherries and 100 pct of either the 1941 or 1945 pack of other frozen foods. Principal beneficiaries under the amended order will be food manufacturers and processors such as bakeries, ice cream manufacturers, and others who purchase fruits in frozen form in the 30-lb containers.

Under the amended provision of the order small users (who are designated as any one using less than 250 base boxes of tinplate annually) may now use the same type of tinplate in containers as large users. Formerly a small user was restricted to the use of 0.25 tinplate (¼ lb of tin per base box of tinplate) for the soldered parts of the container which he was permitted to use.

SUMMARY OF UNITED KINGDOM STEEL STATISTICS

Source: British Iron & Steel Federation

All Figures Thousands of Net Tons	STEEL			PIG IRON	SCRAP	IRON ORE	
	Ingots and Castings	Finished Deliveries	Steel Stock (1)	Production (2)	Steelmaking Consumption	Imported Ore Consumption	Home Production
1944 Total	13599.0	11502.4	2431.5	7542.0	8252.6	2725.6	17332.2
1945 Total	13237.8	9992.3	1885.9	7959.4	8065.9	4494.7	15870.4
1945 March	1102.5	885.2	1747.0	633.4	670.2	270.1	1475.7
April	1059.9	842.2	1688.9	616.4	651.8	287.6	1414.7
May	1180.4	924.0	1630.4	717.9	724.0	343.8	1626.8
June	1067.5	835.0	1566.9	595.8	680.5	307.7	1289.3
July	956.9	695.3	1475.4	603.9	597.1	347.2	1228.8
August	1041.0	796.8	1434.4	701.1	619.3	436.2	1239.2
September	1077.8	792.5	1415.4	624.9	650.0	438.1	1102.5
October	1360.8	932.4	1356.8	818.1	818.1	595.2	1385.4
November	1106.1	803.7	1358.0	672.0	659.9	467.7	1115.5
December	992.3	735.6	1332.4	651.8	592.7	449.7	1036.6
1946 January	1025.0	971.0	1370.9	803.6	753.2	541.5	1373.6
February	1107.5	828.0	1339.3	654.5	653.6	445.8	1147.3
March	1145.5	898.6	1314.7	659.9	695.2	484.2	1148.6
April	1129.4	827.0	1263.1	666.1	684.9	505.7	1090.8

[1] Held by producers and in British Iron & Steel Corp. stockyards at the beginning of the years and months shown.
[2] All qualities, including ferroalloys.

The London ECONOMIST

Labor's Home Policy

Reprinted by special permission to further understanding on how political and economic affairs are viewed in London.

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IT WAS clear from the start that foreign policy would be the main issue of the Labor Party's Annual Conference. On Spain, Greece, Germany, the staffing of the Foreign Office, and a variety of other issues there are deep and genuine differences within the party. Ignorance of the facts or sentimental thinking in many sections of the labor movement is part of the explanation. But there are also big differences of principle and outlook — bigger, quite certainly, than were suggested by Mr. Bevin's personal triumph in debate.

On home policy, on the other hand, the conference has shown very general agreement. There have been occasional clashes on minor issues. One case arose during the first day's debate, when a resolution on the payment of local councillors' expenses out of an Exchequer grant was carried against the platform. But the general mood has been that the government is making good progress towards the party's traditional aims, and should be left to get on with the job undisturbed.

In this atmosphere of practical unanimity, one small but significant discussion has failed to receive the attention it deserved. The former General Secretary of the Fabian Society criticized the National Executive's report on the ground that policy was not yet being formulated for the next general election. It was clear from Mr. Morrison's reply that very little attempt at deciding long-term policy has so far been made.

HERE, clearly, there is a serious danger for the future of the political labor movement. For what in fact is the movement's policy likely to be? For a quarter of a century it has preached broadly the doctrines contained in its 1945 election program, "Let Us Face the Future." There must be a national minimum standard of life, underpinned by social insurance, family allowances, and a national health service. The educational system must be reformed to provide every child with as nearly as possible an equal chance in life. Adequate housing must be guaranteed to every family. Stronger powers are needed to control the use of land, and must be backed by a solution of the problem of compensation and betterment. Most important of all, full employment must be guaranteed through a National Investment Board, the nationalization of a number of key industries, and control of industrial location. Monopolies — a somewhat indefinite category—must be brought under control, and steps taken to increase industrial efficiency.

Different parties will have different views on the value of these measures; and even from the labor standpoint it is possible to criticize the government's method of putting them into effect. But criticism, whether from friends or opponents, will soon be a matter of past history. There is every reason to expect that in three or four years' time, when the next general election is due, the program of "Let Us Face the Future" will be an accomplished fact—so far, that is, as putting acts on the statute book accomplishes anything. No doubt it will still be necessary to tidy up loose legislative ends. But the main legal framework of the New Society proclaimed in the Party's 1944 program will have been erected.

What comes next? No one in the labor movement seems to know; and it is doubtful whether many of the movement's members have even given much thought to it. Obsessed with the problems of its first years of power, the party has tended to forget the problem of following up its initial success.

THE danger in this situation is that the party will simply travel forward along the lines of its past policy without appreciating the new factors which its very success has brought to the front. There was more than a hint of this in the suggestion, in the course of debate, that the main problem was to settle the next batch of industries for nationalization. An approach of this kind would be nothing less than a national disaster. The government has had a powerful case for several of its initial measures of nationalization — a case, that is, in principle, leaving out of account any criticism of the methods actually adopted. But there are very few other industries in which the case is anything like so clear. The proscription of further trades on the ground that nationalization is good in itself would please the rank and file of the Labor Party; but it would be directly contrary to the national economic and political interests.

It would also show a serious misunderstanding of the new economic situation. The more sophisticated latter-day case for nationalization has rested in two arguments. The first has been the need to seize the key points of the economic system in the interests of full employment The second stresses the importance of removing sluggish and restrictively-minded capitalists from the control of industry in the interests of national efficiency.

WHATEVER validity these arguments may have had when applied to the first batch of industries for nationalization, they would have very little when applied to a second batch. Nationalization, it is said, helps full employment by making it easier for the Government to stabilize investment. But even if it does—and those who believe that fruitful investment can be arranged by Treasury Order have some disappointments ahead —the case becomes very dilute when once the heavy-investment industries, such as coal, steel, power and transport, are already under the government's wing. For the

(CONTINUED ON PAGE 152)

Canadian Steel Backlog Remains Heavy

Toronto

• • • With the beginning of third quarter only a few days ahead Canadian iron and steel producers report no excessive outpouring of new orders. On some products mills have not opened their books for the third quarter, and on others the majority have little unfilled capacity. Restricted production of iron and steel during second quarter due to coal shortages, will result in a big carryover of orders into third quarter, thus most books already are jammed and delivery dates against new orders on most steel lines already extend well beyond next September. On some materials mills are booked solidly to the end of the year. Present bookings, however, do not represent a true picture owing to the fact that consumers finding it almost impossible to obtain steel have placed orders with two or three producers in an effort to obtain supplies and there is a possibility that as some shipments come through from one source cancellations will be made at others.

The labor situation is another factor causing some worry to the three big Canadian steel producers, as they have received an ultimatum to the effect that if union demands are not satisfactorily complied with by the 29th of this month, a strike will be called within 10 days. Facing these conditions Canadian steelmakers are reluctant to add additional large tonnage to backlogs that already exceed production capacity for several months ahead. It is the opinion of heads of the steel industry that there is little prospect of improvement in the supply situation this year, and in the event of a labor walkout the situation will become even more critical.

On steel sheets producers are out of the market, with books filled for the third quarter, and there seems little hope of surplus capacity before the year-end. Shortage of sheets is holding up civilian production and most lines of electrical household equipment are reaching retailers in a mere trickle. It is estimated the market for sheets could easily absorb four or five times current supply.

STEEL bar demand continues far in excess of supply and while some barmakers are accepting third quarter business there is no definite promise that delivery will be made. Others are not accepting business at this time, pointing out that delivery dates are too uncertain and books already are filled for the next three or four months. Demand continues to feature carbon bars, while there is still unfilled capacity on alloy bars.

Plate demand is gaining rapidly and delivery against new orders now extends three to four months into the future. Rolling stock builders report difficulty in obtaining sufficient steel for requirements, but so far they have not been forced to curtail operations seriously although the majority

Canadian Steel Production and Shipments

Toronto

• • • Canadian steel mills reported March production of 239,560 tons of carbon and 9557 tons of alloy steel ingots and castings. Shipments of primary shapes in March totaled 254,015 net tons compared with 224,855 tons in February and 243,245 tons in January. The March total included 37,564 tons of semi-finished shapes; 12,297 tons structurals; 18,766 tons plates; 31,287 tons rails; 10,388 tons track materials; 48,558 tons bars; 9396 tons pipes and tubes; 25,764 tons wire rods; 14,448 tons black sheets; 6264 tons galvanized sheets; 455 tons tool steel; 7984 tons castings and 30,844 tons of other shapes.

During March, Canada imported from the United States 1161 tons of foundry pig iron; 522 tons of malleable iron and 199 tons of ingots. The following table shows Canadian production and shipments in net tons for the first three months of 1946:

Three Months Ended March 31, 1946	Carbon Steel		Alloy Steel	
	Made	Shipped	Made	Shipped
Billets, etc., for forging	14,409	15,010	387	974
Other semifinished shapes, not for rerolling	81,899	83,652	151	149
Structural shapes and piling	35,371	37,331	.....	.....
Plates	54,052	50,833	6	.....
Rails	91,115	89,756	.....	.....
Tie plates and track material	22,722	25,292	.....	.....
Tool steel	609	546	522	529
Hot-rolled bars for forging	15,291	14,983	5,582	6,341
Concrete reinforcing bars	11,845	11,537	.....	.....
Hot-rolled bars for cold finishing	2,809	3,004	6	6
Other hot-rolled bars	91,576	91,380	6,647	6,439
Pipes and tubes	36,870	40,560	.....	.....
Wire rods	69,245	69,973	68	47
Hot-rolled black sheets	38,057	35,306	.....	.....
Cold-reduced black sheets	6,272	6,272	.....	.....
Galvanized sheets	19,975	19,753	.....	.....
Steel castings—by ingot makers	13,523	13,748	4,099	3,757
by other foundries	6,409	5,120	133	112
All other shapes, including tinplate, tin mill blackplate, cold finished bars and strips, etc.	91,748	89,348	347	361
TOTAL, ALL PRODUCTS	703,797	703,400	17,928	18,715

Producers' shipments of primary iron and steel, including steel castings shipped by all foundries for the three months ended with March 1946, in net tons, subdivided according to principal consuming industries are as follows:

	Carbon Steel	Alloy Steel
Automotive industries	14,113	9,236
Agricultural, including farm machinery	29,533	403
Building construction	40,263	116
Containers industry	42,403	23
Machinery and tools	20,829	1,899
Merchant trade products	70,013	103
Mining, lumbering, etc.	19,554	1,530
National defence	409	2
Pressing, forming and stamping	21,693	312
Public works and utilities	7,071	177
Railway operating	108,539	895
Railway cars and locomotives	44,968	1,154
Shipbuilding	13,025	72
Miscellaneous and unclassified	8,107	181
Wholesalers and warehouses	73,990	687
Producers' interchange	119,867	492
Direct export:		
To British Empire	43,613	182
To other countries	25,410	1,251
TOTAL SHIPMENTS	703,400	18,715

are operating at about 75 pct of rated capacity. Farm implement makers also are seeking larger deliveries of plate, and there is growing demand from boiler and tank builders.

On all types of structural shapes demand is heavy with supply limited. Many large construction jobs are being held up through shortage of structural steel and various other steel materials. It is estimated that upwards of 50,000 tons of structural shape orders are pending in connection with new construction jobs already announced.

WIRE, nails and screws are in short supply, and producers are jammed with orders, with production well down from the year's peak. Shortage of wire rods is affecting output of these materials, and there are no indications of early betterment in the steel supply situation.

Pig iron production continues to hold at less than 60 pct of rated capacity and supply is tightening at a rapid rate, due to steadily expanding demand and shortage of scrap iron and steel. Merchant pig iron demand calls for delivery of about 12,000 tons weekly, while actual deliveries by blast furnace operators are running about 7500 tons per week. Coal shortage is affecting production, with two of the major producers reporting production down 25 pct from the rate for the first quarter.

Batcheller Heads New Organization Formed From WPB Veterans

Cleveland

• • • **More than** 125 veterans of the War Production Board's Steel Div. met here on June 21, formed a permanent organization to be known as the Steel Division and elected Hiland G. Batcheller president of the new group.

Four former directors of the Steel Div., H. G. Batcheller, president, Allegheny Ludlum Steel Corp.; Norman W. Foy, general manager of sales, Republic Steel Corp.; John T. Whiting, president, Alan Wood Steel Co.; and William B. Todd, assistant to the president, Aetna-Standard Engineering Co., attended the reunion.

Alexander C. Brown, vice-president, the Cleveland-Cliffs Iron Co., who acted as chairman of the general committee to arrange the meeting, served as toastmaster at the dinner.

On the committee with Mr. Brown were the following former members of the Steel Div.: Mr. Foy; R. C. Allen, Oglebay, Norton Co.; Harry M. Francis, American Steel & Wire Co.; M. B. McCafferty, Wheeling Steel Corp.; Alexander Miller, Columbia Iron & Metal Co.; William F. Vosmer, Republic Steel Corp.; E. F. Clark, Weirton Steel Co.; Philip Sandmaier, Republic Steel Corp.; Clifton L. Wyman, Butler Brothers; Harry W. McQuaid, Republic Steel Corp.; Francis Brown, Pickands, Mather & Co.; Henry Troxel, Carnegie-Illinois Steel Corp.; Edward Pratt, Republic Steel Corp., all of Cleveland; and Frank E. Vigor, American Rolling Mill Co., Middletown, Ohio; Melvin W. Cole, Bethlehem Steel Corp., Detroit; and Mr. Todd, Pittsburgh.

Normal Operations Lag

Pittsburgh

• • • **Steel fabricating** plants in the Pittsburgh District, according to a survey by the Tristate Industrial Assn., are operating now about 80 pct of normal because of their inability to completely recover from the steel, coal and railroad strikes.

Ray Booth, association secretary-manager, stated that the lack of steel and other materials has caused some of the companies to trade surplus stocks among themselves in order to better balance out their required materials.

OPA Allows Price Rise On Refractories, Tools

Washington

• • • **Reflecting wage increases** granted by the Wage Stabilization Board, OPA has announced an increase of 24.2 pct in manufacturers prices for electric furnace refractories, effective June 26.

Also effective June 26, heavy forged tools and mining tools went up to the manufacturers' level 10 pct over October, 1941, prices. Distributors were permitted to pass on the dollar amount of the manufacturers' increases.

A 7 pct increase over their base date "freeze" ceiling prices had been granted manufacturers of industrial sewing machines and equipment, effective June 21. Jobbers and other resellers were permitted to increase their ceiling prices the same percentage as their costs are increased.

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• • • **Portable electric** power driven tool manufacturers were granted in interim price increase of 15 pct, effective June 21. Resellers are permitted to increase their maximum prices the same percentage as their invoiced costs are raised.

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• • • **Chain** of the type suitable for power transmission, conveyors and timing may be advanced 13 pct in price effective June 21. OPA states that this increase over October 1941 prices is an extension of the increase recently authorized for manufacturer sale of gears, sprockets and speed reducers recently authorized.

THUNDERJET: *AAF's newest fighter is the fastest plane disclosed to date with speed in excess of* 590 *mph and* 1000-*mile range. The XP-84, built by Republic and powered by a GE axial flow jet unit, has a service ceiling of more than* 40,000 *ft.*

Industrial Briefs . . .

• WESTERN EXPANSION — Harvey Machine Co., Inc., has opened a brass and aluminum extrusion division at Torrance, Cal. Five extrusion presses in the Harvey plant have a potential capacity of more than 1,500,000 lb per month. Rod and bar stock, tubing, angles, standard and special shapes which can be extruded through these presses will provide hundreds of western plants with materials from which to manufacture thousands of articles.

• TRANSFERS PROPERTY — The M. A. Hanna Co. has announced that all of the coal mining properties of the Hanna Coal Co. in Ohio have been transferred to the Pittsburgh Consolidation Coal Co. The company reported that the move concentrates in the Pittsburgh Co. all the bituminous coal mining operations in which the Hanna Co. is interested. The operation of the properties will continue in the name of the Hanna Coal Co. without change in personnel.

• NAMED DISTRIBUTOR—Bryant Machinery & Engineering Co., Chicago, has been appointed exclusive distributor for the sales territory covering Chicago and immediately surrounding vicinity, for the hydraulic press line manufactured by the Denison Engineering Co., Columbus, Ohio.

• APPROVES SALE—The WAA has approved the sale to the American Screw Co. of the Willimantic, Conn., plant formerly belonging to the DFC and leased to the United Aircraft Corp.

• NEW BRANCH OFFICE—Lukens Steel Corp., and a subsidiary, By-Products Steel Corp., have opened a branch sales office in Cleveland, according to J. Frederic Wiese, vice-president in charge of sales for the companies. Robert H. McCracken will be in charge of the new office.

• WELDING BOOKLET — The American Welding Society has recently published a 22-page booklet entitled "Recommended Practices for Automotive Flash-Butt Welding," prepared by the AWS automotive welding committee and based on a survey of flash-butt welding as used by the automobile industry. Copies may be obtained from the society at 33 W. 39th St., New York, at 30¢ per copy.

• NEW OFFICER — Walter L. Schneider, vice-president of The Falk Corp., Milwaukee, was elected treasurer of the American Gear Manufacturers Assn. at their 30th annual meeting.

• CHANGE OF ADDRESS — Engineering Service, Inc. has announced the new address of the company's western office now located at 406 E Colorado Ave., Glendale, Cal.

• ACQUIRES PLANT — Hagan Corp., Pittsburgh, has reported acquisition of the Willburt Co.'s plant No. 1 at Orrville, Ohio, in which all Hagan equipment has been manufactured for 27 yr. The Willburt stoker plant is not affected by the purchase.

• EXPANSION PLANNED — The Heil Co. of Milwaukee will add a $500,000 addition to their present plant. The addition will consist of two wings to facilitate their production line.

• NEW ORGANIZATION—The new Chicago firm of Bassin, Cheskin & Tokarsky, architects, engineers and planners, is offering a service designed to meet the expanding needs of the construction industry. This office is located at 407 S Dearborn St., Chicago.

• BOOKLET REVISED—A revision of page 11 of the booklet "How to Buy Surplus Machine Tools," may be obtained by writing to the National Machine Tool Builders' Assn.

Lake Superior Iron Ore Prices Increased 50¢

Washington

• • • **An increase** of 50¢ per gross ton in the ceiling prices for iron ore produced in Minnesota, Wisconsin and Michigan has been announced by OPA. The increase was effective June 24.

Reduction in output has increased production costs 32¢ a ton, the price agency said, the mine wage increase added another 11¢ to the total, and an additional 7¢ was allowed to compensate for underground operations.

The new ceiling prices for standard Lake Superior iron ores are as follows:

Mesabi bessemer	$5.20
Old Range non-bessemer	5.30
Mesabi non-bessemer	5.05
Old Range bessemer	5.45
High phosphorus	5.05

Maximum prices on all other ores including special ores and lump ore were also increased 50¢ a ton.

National Tube Builds New Facilities at Lorain

Lorain, Ohio

• • • **To speed delivery** of small-size pipe, National Tube Co., U. S. Steel subsidiary, has begun construction of a quarter-mile long warehouse as the latest step in a broad postwar improvement program at the company's Lorain, Ohio, pipe mills. Contract for the warehouse has been awarded American Bridge Co., and work on the project is under way.

It will house pipe racks, cranes, and other new equipment necessary to stock and ship the many different kinds of steel pipe in carload lots required by the trade. Completion of the project will provide National Tube with a modern warehouse, in a central market location.

Previously announced projects in the Lorain program are the installation of three additional by-product coke batteries, which will increase the cokemaking capacity of the plant to 1,650,000 tons annually, and the concentration of the company's buttweld pipe manufacture and galvanizing facilities at Lorain.

Construction Steel...

New York

• • • **The estimated total** bookings of fabricated structural steel for the month of May 1946, according to reports received by the American Institute of Steel Construction, amounted to 162,908 tons, an increase of 35 pct over the preceding month and 29 pct over the average May bookings for the five prewar years 1936-1940.

May shipments, totaled 111,686 tons. The shipments for the first five months of this year were 498,348 tons as compared with 543,110 tons for the same period in the five prewar years. This drop has resulted from the effects of the recent steel and coal strikes which not only directly affected this industry, but resulted in a curtailed supply of structural shapes from the rolling mills.

The tonnage available for future fabrication at May 31 amounted to 615,368 tons which is practically double the average backlog of 337,237 tons at the end of May in the years 1936-1940.

Following is the complete tabulation of bookings and shipments:

CONTRACTS CLOSED	Estimated Total Tonnage for the Entire Industry, 1946	Estimated Total Tonnage for the Entire Industry Avg., 1936-1940
January	235,817	107,578
February ...	132,707	96,280
March	173,871	124,558
April	120,248*	110,783
May	162,908	126,237
Totals	825,551	565,436
SHIPMENTS		
January	107,490	92,578
February	63,803	88,626
March	102,803	115,031
April	112,566*	123,650
May	111,686	123,225
Totals	498,348	543,110

* Revised

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Washington

• • • **Birch, Johnson & Lytle,** Seattle, Wash., have been awarded a War Dept. contract approximating $24 million for construction of army facilities in Alaska. The work will include expansion of technical and housing facilities at Ladd field, Fairbanks and Fort Richardson, Anchorage. Fay, Spofford & Thorndike, Boston, was awarded the contract for architect-engineer services totaling about $900,000.

• • • **Fabricated steel awards** this week included the following:

3075 Tons, Baltimore, manufacturing plant, to American Bridge Co. through Baltimore Contractors Inc., general contractors.

2000 Tons, Bettendorf, Iowa, rolling mill for Aluminum Co. of America, to American Bridge Co.

740 Tons, Lincoln, Ill., building, to American Bridge Co.

695 Tons, Chicago, United Airlines hangar, to American Bridge Co.

600 Tons, Vandalia, Ill., Kankaskia River highway bridge, to Illinois Steel Bridge Co., Jacksonville, Ill.

500 Tons, Louise, Ariz., fixed wheel gates, Davis Dam, to American Bridge Co.

425 Tons, Philadelphia, bottling plant for Coca-Cola, to Phoenix Bridge Co.

315 Tons, Odair, Wash., trashrack, U. S. Bureau of Reclamation specification 1324, to Treadwell Construction Co., Pittsburgh.

305 Tons, Louise, Ariz., gate frames, Davis Dam, U. S. Bureau of Reclamation, to Omaha Steel Works, Omaha.

300 Tons, Los Angeles, Johns-Manville plant addition, through R. E. McKee to Pacific Iron & Steel Co.

300 Tons, Long Beach, Cal., main building addition for Associated Telephone Co., through M. Sasso, to Consolidated Steel Corp.

170 Tons, Lackawanna City, Pa., bridge, through Pine Brook Iron Works, to Phoenix Bridge Co.

140 Tons, Carneys Point, N. J., building for E. I. Du Pont de Nemours Co., to Morris Wheeler Co.

• • • **Fabricated steel inquiries** this week included the following:

1200 Tons, Pittsburgh, highway bridges, Allegheny County.

1000 Tons, Muskegon, Mich., factory addition, Continental Motors Corp.

1000 Tons, Cleveland, bus terminal.

925 Tons, White River Ark., temporary bridge, U. S. Engineer.

875 Tons, Trenton, N. J., factory, Crescent Insulated Wire & Cable Co.

710 Tons, Omaha, stadium, Peter Kiewit & Sons Co., low bidder on general contract.

450 Tons, Cambridge, Mass., warehouse for Stahleker Steel Co.

365 Tons, Clearfield City, Pa., Pennsylvania Dept. of Highways, bridge, due June 28.

300 Tons, Washington City, Pa., Pennsylvania Dept. of Highways, bridge, due June 28.

270 Tons, Bergen City, N. J., New Jersey Dept. of Highways, bridge for Erie Railroad over Route 4, due July 10.

150 Tons, Philadelphia, catapult building for U. S. Naval Air Station, bids in.

140 Tons, Odair, Wash., switchyard, U. S. Bureau of Reclamation, specification 1360, bids July 2.

140 Tons, Sweetwater Co., Wyo., bridge, Granger Jct. road, State Highway Commission, Cheyenne, bids open June 27.

135 Tons, Johnsville, Pa., human centrifuge building for U. S. Naval Air Station, bids in.

120 Tons, Earp, Cal., switchyard, U. S. Bureal of Reclamation, specification 1370, bids July 12.

• • • **Reinforcing bar awards** this week included the following:

2300 Tons, Los Angeles, Hyperion outfall sewer, through Guy F. Atkinson, to Bethlehem Pacific Coast Steel Corp.

300 Tons, Detroit, elevator, International Milling Co., to Bethlehem Steel Co., through Fegles Construction Co., Minneapolis.

150 Tons, St. Paul, Minn., building, Donaldson Co., to Ceco Steel Products Corp., Chicago.

130 Tons, Hopkins, Minn., warehouse, Winston & Newell Co., to Cowin & Co., Minneapolis.

100 Tons, Minneapolis, building, Charles Paper Bag Co., to Paper, Calmenson & Co., St. Paul, Minn.

100 Tons, Milwaukee, Pabst Brewing Co., to W. H. Pipkorn Co., Milwaukee.

• • • **Reinforcing bar inquiries** this week included the following:

2000 Tons, Bettendorf, Iowa, Aluminum Co. of America rolling mill.

1825 Tons, Fairfield, Ohio, Patterson Field runway.

1655 Tons, Sunbury, Pa., generating plant.

150 Tons, South Bend, Ind., Bell Telephone Co. exchange.

780 Tons, Fairfax County, Va., highway paving.

500 Tons, New York City, Abraham Lincoln housing.

295 Tons, Painesville, Ohio, Blaw-Knox Co. construction.

100 Tons, Muncie, Ind., Bell Telephone Co. exchange.

100 Tons, Multnomah Co., Ore., Columbia River highway, Mt. Hood National Forest, Public Roads Administration, Portland, bids open June 26.

• • • **Plate awards** this week included the following:

300 Tons, Pasco, Wash., discharge pipe, U. S. Bureau of Reclamation specification 1233, to Western Pipe & Steel Co., San Francisco.

300 Tons, Nash, Utah, penstocks, U. S. Bureau of Reclamation specification 1363, Western Pipe & Steel Co., to San Francisco.

British Surplus Sales Amount to $360 Million

London

• • • **Disposal by British** Government departments of surplus war stores has in the past six months realized $360,000,000. The material sold overseas and to UNRRA amounted to $240,000,000 and further stores of over $80,000,000 have been redistributed to other governmental departments.

Arthur Woodburn, Joint Parliamentary Secretary to the British Ministry of Supply, has stated that during April the ministry sold $32,000,000 worth of goods, making it possibly the biggest selling organization in Britain. They were faced not only with the disposal of a great mass of articles and materials accumulated as a result of the war, but with the necessity to produce new articles and materials, and they had to be careful that the former did not interfere with the latter.

During the next twelve months between 150,000 and 200,000 wheeled vehicles will be available for sale; 60,000 of all types have been sold already, and 30,000 are ready for sale. About $48 000,000 has been realized from the sale of 50,000 machine tools, in which British industry got absolute purchasing priority.

MACHINE TOOLS

. . . News and Market Activities

Surplus Disposal by Dealers Threatened

Cleveland

• **Disposal of Government-owned** surplus machine tools by "approved dealers" which has threatened to bog down in a morass of political dabbling, red tape and criticism ever since its inception last spring is finally stuck with a legal stymie, in the form of a ruling by Comptroller General Lindsay Warren that the War Assets Administration lacks authority to pay commissions.

This development, which has been under wraps for some weeks, climaxes the young and turbulent life of the WAA and threatens to bring to at least a temporary halt participation of many dealers in the disposal of surplus machine tools.

While Comptroller General Warren's ruling was made specifically in the case of machine tool dealers, a WAA spokesman said that it means the stoppage of the industry-agent contracts for electronics and aircraft parts, and that the WAA may not, for the present, proceed with its plans for employing private merchandising groups at sight sales.

In declaring WAA to be without legal authority for arranging machine tool dealer contracts, the General Accounting Office took the position that the Reconstruction Finance Corp. and the former War Assets Corp. were empowered to make commission payments by reason of the corporate structure of those two organizations. The WAA, on the other hand, was established on March 25, as an administration and, as such, is without authority to make such payments, it was said.

Thus commission payments on dealer contracts which were signed before Mar. 25, will continue to be made, but contracts signed after that date are considered by the GAO as invalid and commission payments have been stopped. The entire matter is now being studied by officials of WAA, GAO, and a surplus property group and WAA officials are trying to persuade Comptroller General Warren to change his ruling on the ground that the decision penalizes business men who signed contracts after Mar. 25.

In machine tool centers, some observers viewed this latest turn of events as the final straw, indicating that it will only serve to undermine further the confidence of dealers in WAA and its involved operations. Another reorganization of WAA is reportedly in progress under the aegis of Frank Creedon, Deputy Administrator for General Disposal. Industry sources who would welcome any improvement, feel that better things are coming.

In Cincinnati, new lines are being added to present machine tool builders' lists, one in particular, Bradford Machine Tool Co., in business for 106 yr, has reported that they will now produce electrical tools including hand drills and many sizes and kinds of grinders.

In the New England sector, surplus machine tools continue to move freely and new equipment slowly. The Boston office of WAA, in a semimonthly report, shows 790 miscellaneous tools sold on approximately 430 individual transactions in that period of time. Of the 790 tools sold, better than 100 were drills, and about 40 of these were taken by GI's and municipalities at $10.70 to $98.54 per drill.

Several Connecticut machine tool builders and a sprinkling of Rhode Island and Massachusetts builders bought lathes, milling machines, drills and grinders, while small tool makers took lapping machines.

Those New England machine tool builders who long ago recognized the importance of plastics and began producing plastic injection molding machines are weathering the glut of surplus government equipment. The slack in their sales of regular line tools to domestic users as a result of surplus equipment offerings has been taken up not only by sales of plastic equipment to domestic but to foreign users as well.

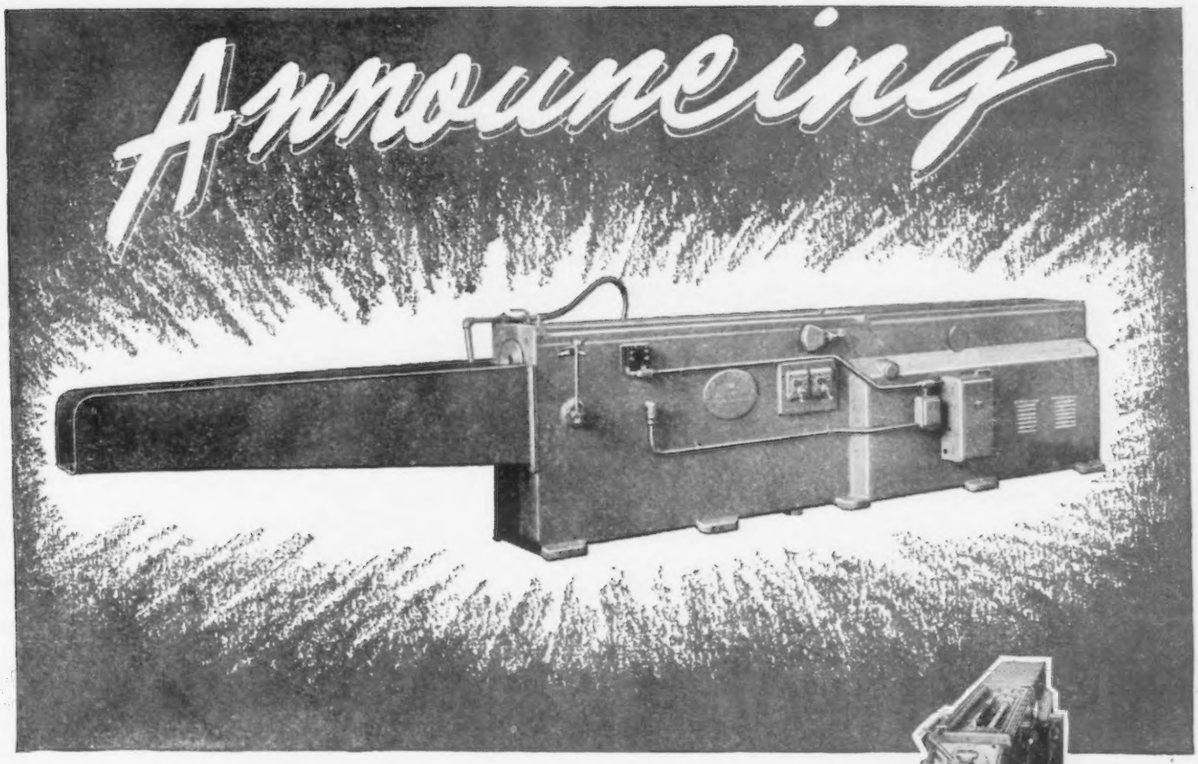
Retooling activity in the Detroit area is spotty. Some automobile producers appear to be fairly advanced in their retooling plans on 1947 models while others are lagging, possibly with the idea of waiting for future developments to force a decision with respect to new models. Ford has indicated that new models will be introduced "some time after Jan. 1." General Motors is well advanced in its tooling for new models although little is known of GM introduction plans. It is generally believed that the Ford light car is farther advanced than the new Chevrolet.

An extensive tooling job which has been completed rather quietly is the retooling of practically the entire refrigerator industry to increase production per man hr and speed up introduction of the latest models. Had not material shortages interfered, the output of refrigerators would undoubtedly have reached a new high by this time.

Electrical equipment continues to be the biggest bottleneck in machine tool production, and deliveries of electrical equipment for machine tools are extended far into the future, almost to the point that they are so unrealistic that they actually mean nothing. For example, 3-phase motors, 1 to 5 hp, have a 50 to 52-week delivery, while single-phase motors of the same capacity range are being offered for delivery in 100 weeks. Standard 3-phase, 5 to 25-hp motors have delivery schedules of 52 weeks.

Fractional hp motor manufacturing capacity is booked pretty solid through June, 1947, and the second half of 1947 is already being crowded with orders. As a matter of fact, 18 months is about the delivery that can be promised on these units. This condition is true on both ac and dc motors.

As to machine tool electrical controls, the delivery situation is only slightly better. On standard controls that require no special engineering of any type, deliveries range between 6 and 10 months. On controls where there is engineering required, the deliveries range between 10 and 14 months, depending upon the amount of engineering required.



A NEW *American*

HORIZONTAL BROACHING MACHINE

For Heavy-Duty Internal and Surface Broaching

Engineered by *American*, this new horizontal broaching machine is designed to perform a wide variety of internal and surface broaching operations. It is particularly adapted to heavy-duty broaching involving the removal of a large amount of metal or broaching of large work pieces. As always, fast, accurate production with fine finish is possible.

This new *American* machine is made in two standard sizes, as shown in the table below:

	MODEL HD-15-66	MODEL HD-20-66
Pull Capacity	15 tons	20 tons
Stroke	66"	66"
Maximum Length of Broaching Tool	72"	72"

Write for complete details on these and other *American* broaching machines.

Left: This outer support table provides a guide for the broach rear pilot and an automatic support jack for the broach shank. Available, at extra cost, on all *American* standard horizontal broaching machines, it eliminates manual handling of the broaching tool. Slide is equipped with ball bearings to reduce wear and facilitate movement.

MEMBER BROACHING TOOL INSTITUTE

American BROACH AND MACHINE CO.

ANN ARBOR, MICHIGAN

•

BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY

DIVISION OF SUNDSTRAND MACHINE TOOL CO.

NONFERROUS METALS

. . . News and Market Activities

Marginal Mines Share Copper, Lead Increases

New York

• • • **The office of Economic** Stabilization has issued Directive 125 on June 18 to modify the provisions of the Premium Price Plan with respect to marginal producers of copper and lead so as to compensate for the price increases on these metals granted on June 3.

The *Joplin Globe* analyses the effect of the action on lead producers as follows: "The new contract price of $99.96 a ton for lead concentrates, which includes the recent increase of $23.95 a ton, has in effect, under the OES adjustment of subsidy payments to conform with the new lead price ceilings, reduced the total price to those producers receiving the A quota premiums.

For other nonferrous metals news see pp. 103 and 104.

"The A premium has been reduced $26.60 a ton, based on the 1.75¢ a pound taken off to off-set the increase in the ceiling on pig lead from 6.35 to 8.10¢, East St. Louis. This reduction is computed on the basis of 95 pct metal recovery on 80 pct lead concentrates, or 1,520 lb of metal to the ton of galena.

"Under the OES ruling, the A quota producer now receives a total of $115.16 a ton ($99.96 contract price plus $15.20 premium) as compared with $117.81 a ton ($76.01 contract price plus $41.80 premium) before the increase in the ceiling price — an overall loss of $2.65 a ton on the metal contract basis. The same producer subjected to the Eagle-Picher Central mill settlement basis now receives $5.60 a ton less, i.e., $112.40 a ton ($97.20 plus $15.20 premium) as against $118 ($76.20 plus $41.80 premium)."

For major copper mines, producing more than 2000 tons of copper in 1942, premiums are not to exceed the difference between 22¢ per lb and the ceiling of 14.375¢.

•

Canada's Nickel Output Up

Ottawa

• • • **Canadian production** of copper for April amounted to 15,943 tons compared with 16,172 tons in March and 21,478 tons in April, 1945. April exports of copper ore, concentrate and matte were 1054 tons, and 9330 tons of ingots, slabs and bars.

Nickel production in April totaled 9240 tons compared with 7838 tons in the preceding month and with 10,831 tons in April, 1945. Nickel exports in the month amounted to 15,352 tons.

Production of unrefined lead amounted to 15,432 tons against 15,644 tons in March and 14,086 tons in April last year. Exports of lead in pigs totaled 13,723 tons and ore 33 short tons.

Zinc production in April was 20,797 tons compared with 21,479 tons in March and 21,693 tons in April, 1945. Spelter exports in April totaled 13,252 tons and ore 5706 short tons.

•

Malay Tin Production Low

Washington

• • • **Great Britain** has notified the United States Operating Committee of the Combined Tin Committee that the production of tin concentrates in Malaya during the first quarter of 1946 amounted to 802 tons (metal content).

Last February a British mission which started investigating the tin situation after Malaya was recaptured by the Allies estimated total 1946 production there at 12,500 tons. The average prewar production was approximately 75,000 tons.

About half of the first quarter production was obtained from hand-washing (Dulang mining) and the rest mainly from Chinese-operated gravel pump mines. Ninety-one mines (including four dredges) were operating on a restricted scale in March compared with 75 in January and 80 in February. No dredges were operating in January and February. The labor force employed in tin mining increased from 11,363 in January to 13,292 in March, it was reported.

The Combined Tin Committee is an autonomous international body whose function is to assure cooperation in the distribution of tin during the emergency period of global short supply.

Congress Action To Sell Treasury Silver

New York

• • • **The Senate has** authorized the sale of Treasury silver not earmarked for currency backing at a price of 90.3¢ per oz for the next two years after which it is to be sold at $1.29, the Treasury buying price. The action was taken on a rider to the Treasury-Post Office bill. The House of representatives has already authorized the sale of free Treasury silver at the price of 71.11¢ per oz. Now the difference in selling price for Treasury silver must be adjusted by a conference committee of the two legislative bodies. It is understood that the Western Senators are adamant in holding out for a price of 90.3¢ minimum.

There are reported to be 225 million oz of non-monetized silver held by the Treasury which can be expected to be released for industrial use when the conference committee report is accepted by both houses. Previous sale of government silver ended on Dec. 31. For months silver has been in critically short supply, serving to bottleneck the production of electrical equipment where it is used for contact points, and some bearing alloys. Film and photographic paper manufacturers have long been practically inactivated due to the lack of silver.

It is estimated that U. S. industry could make use of 125 million oz of silver during 1946. The most optimistic predictions of domestic production plus imports during 1946 reach 80 million oz.

•

Aluminum Ingot Prices Up

New York

• • • **Demand for ingot** aluminum and aluminum for deoxidizing steel has strengthened and prices of ingot producers have been increased by ¼ to ½¢ per lb.

Primary aluminum producers are reported to be absorbing a large proportion of the available scrap on the market but remelters are obtaining sufficient scrap for their requirements.

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point (min. 10,000 lb)	15.00
Aluminum pig, f.o.b. shipping point	14.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars per lb contained Be.	$14.75
Beryllium aluminum, 5% Be; dollars per lb contained Be.	$30.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Copper, electro, Conn. Valley	14.375
Copper, electro, New York	14.125
Copper, lake	14.375
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$ 2.25
Iridium, dollars per troy oz.	$110.00
Lead, St. Louis	8.10
Lead, New York	8.25
Magnesium, 99.9 + %, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb flask, f.o.b. New York	$101 to $103
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$56.00
Silver, New York, cents per oz.	70.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65
Zirconium copper, 6 pct Zr, per lb contained Zr	6.00

Remelted Metals

(Cents per lb)

Aluminum, No. 12 Fdy. (No. 2)	11.25 to 11.75
Aluminum, deoxidizing Nos. 2, 3, 4	10.00 to 11.50
Brass Ingot	
85-5-5-5 (No. 115)	15.50
88-10-2 (No. 215)	18.75
80-10-10 (No. 305)	18.25
No. 1 Yellow (No. 405)	12.50

Copper, Copper Base Alloys

(Mill base, cents per lb)

	Extruded shapes	Rods	Sheets
Copper	25.66	....	25.81
Copper, H.R.	....	22.16	....
Copper drawn	....	23.16	....
Low brass, 80%	....	24.35	24.66
High brass	....	....	24.38
Red brass, 85%	....	24.67	24.98
Naval brass	23.84	22.59	28.53
Brass, free cut	....	18.53	....
Commercial, bronze	....	25.50	25.81
Manganese bronze	27.45	25.95	32.03
Phosphor bronze, A, B, 5%	....	43.68	43.43
Muntz metal	23.59	22.34	26.78
Everdur, Herculoy, Olympic or equal	....	29.82	30.88
Nickel silver, 5%	....	34.44	32.38
Architectural bronze	22.50	....	....

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall: 3S, 43.5¢, 52S-O, 67¢ 24S-T, 71¢: base, 30,000 lb.

Plate: ¼ in. and heavier: 2S, 3S, 21.2¢; 52S, 24.2¢; 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75S-AL, 30.5¢; base, 30,000 lb and over.

Flat Sheet: 0.136-in. thickness: 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb and over.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 28¢; 63S, 27¢; 75S, 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 27.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢ 1 in., 2 in., 27¢; base, 5000 lb. *Rod:* 2S, 3S, 1¼ to 2½ in. diam, rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. *Round Wire:* drawn, coiled, B & S gage 17-18: 2S, 3S, 33.5¢; 56S, 39.5¢; 10,000 lb base; B & S gage 00-1: 2S, 3S, 21¢; 56S, 30.5¢; B & S 15-16: 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

(Continued, See Next Column)

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb or more, 46¢ a lb; 25 to 90 lb, 56¢; less than 25 lb, 66¢.

NONFERROUS SCRAP METAL QUOTATIONS

†*(OPA basic maximum prices, cents per lb, f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)*

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	11.50
No. 1 tinned copper wire, No. 1 tinned heavy copper	11.50
No. 2 wire, mixed heavy copper	10.50
Copper tuyeres	10.50
Light copper	9.50
Copper borings, No. 1	11.50
No. 2 copper borings	10.50
Lead covered copper wire, cable	....*
Lead covered telephone, power cable	....*
Insulated copper	....*

OPA Group 2†

Bell metal	17.25
High grade bronze gears	15.00
High grade bronze solids	....*
Low lead bronze borings	....*
Babbitt lined brass bushings	14.75
High lead bronze solids	....*
High lead bronze borings	....*
Red trolley wheels	12.50
Tinny (phosphor bronze) borings	12.25
Tinny (phosphor bronze) solids	12.25
Copper-nickel solids and borings	11.00
Bronze paper mill wire cloth	11.25
Aluminum bronze solids	10.75
Soft red brass (No. 1 composition)	10.75
Soft red brass borings (No. 1)	10.75*
Gilding metal turnings	10.25
Contaminated gilded metal solids	10.25
Unlined standard red car boxes	10.00
Lined standard red car boxes	9.50
Cocks and faucets	9.50
Mixed brass screens	9.50
Red brass breakage	9.25
Old nickel silver solids	7.60
Old nickel silver borings	7.50
Copper lead solids, borings	6.75
Yellow brass castings	7.50
Automobile radiators	8.75
Zincy bronze solids, borings	9.75

OPA Group 3†

Fired rifle shells	9.50
Brass pipe	8.75
Old rolled brass	8.25
Admiralty condenser tubes	8.75
Muntz metal condenser tubes	8.25
Plated brass sheet, pipe reflectors	7.75
Manganese bronze solids	8.00[1]
Manganese bronze solids	7.00[2]
Manganese bronze borings	7.25

OPA Group 4†

Refinery brass	6.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 pct. [2] Lead content 0.41 to 1.00 pct.

Brass Mill Scrap†

Briquetted cartridge brass turnings	10.375
Cartridge brass turnings, loose	9.625
Loose yellow brass trimmings	9.625

Aluminum

Plant scrap, segregated

2S solids	8.00 to 8.50
Dural alloys, solids 14, 17, 18, 24S, 25S	4.25 to 4.50
turnings, dry basis	1.50 to 1.75
Low copper, alloys 51, 52, 61, 63S solids	7.00 to 8.00
turnings, dry basis	5.00 to 6.50

Plant scrap, mixed

Solids	4.25 to 4.50
Turnings, dry basis	1.50 to 1.75

Obsolete scrap

Pure cable	6.50 to 7.50
Old sheet and utensils	5.00 to 5.50
Old castings and forgings	5.00 to 5.50
Pistons, free of struts	4.00 to 4.50
Pistons, with struts	2.50 to 3.00
Old alloy sheet	2.00 to 2.50

Magnesium*

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	1.50

Mixed, contaminated plant scrap

Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	2.00
Grade 2 borings and turnings	1.00

*Nominal.

Zinc

New zinc clippings, trimmings	6.50
Engravers, lithographers plates	6.50
Old zinc scrap	4.75
Unsweated zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 1.40¢ a lb from refined metal basing point prices for soft and hard lead including cable, for f.o.b. point of shipment price.

Soft lead scrap	6.50

Nickel

Ni content 98+%, Cu under ½%, 23¢ per lb; 90 to 98% Ni, 23¢ per lb contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	29.75
Electrodeposited	23.47
Rolled, oval, straight	23.97
Curved, 18 in. or longer	23.97
Brass, 80-20, frt allowed	
Cast, oval, 15 in. or longer	27.25
Zinc, cast, 99.99, 15 in. or longer	16¼
Nickel, 99 pct plus, frt allowed	
Cast	47
Rolled, depolarized	48
Silver, 999 fine	
Rolled, 100 oz. lots, per oz.	80¾

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 1-5 bbls	34.00
Copper sulphate, 99.5, crystals, bbls	7.75
Nickel salts, single, 425 lb bbls, frt allowed	13.50
Silver cyanide, 100 oz lots, per oz.	0.655
Sodium cyanide, 96 pct, domestic, 100 lb drums	15.00
Zinc cyanide, 100 lb drums	33.00
Zinc sulphate, 89 pct, crystals, bbls, frt allowed	6.35

SCRAP

. . . News and Market Activities

Supply Called Worse Than During War

New York

• • • **Mills and foundries** are finding scrap supply tighter this week than at any time during the war. To the basic shortage induced by the strikes a new factor has been added. It is a situation closely parallel to that which the housewife finds in trying to buy meat.

Reports from all over the nation indicate that dealers are holding back what they can afford to retain in view of the fact that OPA may either die or be seriously emasculated by July 1. And while most industrial users are being pressured to return scrap to their steel supplier it is known that a prominent railroad is holding back 10,000 tons in expectation of a price rise.

•

PITTSBURGH—Scrap is scarcer now in this area than at any time during the war, and it was indicated by consumers that Chicago is tighter than Pittsburgh and the Mahoning Valley district is practically impossible. Consumers are paying low phos premiums for scrap and reports are becoming more widespread that at least in Chicago and in the Warren-Youngstown district, the $2 a ton molybdenum premiums are being paid. Mills here are using more than they can buy, dipping constantly into stocks. Steel producers are going after their customers to insure that the production scrap in consumer plants is directed back to the mills of the steel supplier. The Civilian Production Administration called a meeting to form an iron and steel scrap advisory committee on June 26, and it is believed that scrap allocations were up for discussion. Dealers still have some tonnages laid down, but refuse to sell it. It is still their feeling that a price increase will be granted, despite OPA's recent turndown.

•

CHICAGO—Rail shipments of scrap to two major producers and one minor producer in this district from the West Coast now exceed 10,000 tons. However, prospect for further shipments is dimmed by the belief that little further material is available there. Lack of scrap continues to affect seriously the openhearth operating rate of at least two major district producers. No increased supply of production scrap is apparent, and many manufacturing industries producing scrap are operating as low as 50 pct of capacity because of lack of new steel.

•

PHILADELPHIA — Scrap continues tight with brokers attempting to distribute it equitably to all consumers to keep them operating. Some mill officials have stated that in scrap the worst is yet to come. Practically all mills are apprehensive of the pig iron supply position and some concede that there may be furnace shutdowns because of the lack of scrap and pig iron. Meanwhile operations are maintained reasonably high.

•

DETROIT—The oft-repeated threat that a number of foundries in this area will be forced to shut down because of lack of pig iron, scrap or coke (or all three) is not being taken lightly any more. The threatened shutdown of Packard because of a shortage of pig has been temporarily averted but pressure on other castings producers is constantly increasing. Most automobile companies are now preparing their own scrap for their own foundries and, with collections at the lowest levels in years, the pressure on scrap dealers is admittedly stronger today than at any time during the war.

•

BOSTON—Little constructive news is available. Busheling, turnings and boring the attitude that April 1941, price of an edge on those of heavier material, but they, like all grades of scrap, are hard to pick up, according to brokers. Interest in low phos, fetching more than steel, appears livelier, but is restricted by supply. Whenever possible common practice is to upgrade. The trade is long on gossip, rumors, speculation on life of OPA and, in fact, everything except business.

•

NEW YORK — Scrap movement from this area is very slow with no significant developments to report. The scheduled sale of Navy vessels by the Philadelphia Navy Yard was postponed to June 24 and there is some speculation that this may signify the Navy's desire to hold back for a possible rise in scrap ceilings. Foundry scrap and low phos is in a worse supply position than steel scrap. Market observers are not hopeful of any early change in the scrap picture.

•

BUFFALO—Scrap production remained at a low ebb this week, with dealers taking the attitude that April, 1941, price schedule combined with sharply increased operating costs offer no incentive for scouting around for material. Hopes that OPA will be scrapped shortly may be a factor, but trade leaders did not appear especially optimistic regarding this possible source of relief. Meanwhile big consumers showed no signs of panic over the slow movement. Most of the light rail lists, for example, are going to out of town mills willing to pay the $3.50 a ton preparation charge which local users have sidestepped.

•

ST. LOUIS—Their demand for a price increase denied, scrap iron shippers continue to hold on to their inventories in the hope that they may be able to charge higher prices with the possible end or emasculation of OPA with the result that receipts are very light. There is no industrial scrap and railroad lists are few, both the result of the steel strike. The Missouri Pacific has a list of 36 carloads to offer.

•

CINCINNATI—With production scrap still not flowing in substantial quantities, the scrap iron and steel market continues to be tight. Dealers generally do not anticipate much improvement in the situation for at least 30 days, although, shutdowns the end of this month and the first of July in some foundries for a holiday period and vacations, may tend to ease the pressure a trifle. A few mills in the area have modest reserves that are tiding them over the present deficiency, but others are entirely dependent upon current shipments in order to operate.

•

CLEVELAND—The shortage here has finally reached a crisis, with some major producers practically operating on a car-to-furnace basis and prepared to take off furnaces for lack of scrap at almost any time. Steel producers who maintained the highest operating rates during the recent coal strike are, of course, particularly hard hit. Low phos is the only grade showing much activity in the consumer scramble, with mills disregarding freight rates and taking shipments from anywhere from Portland, Ore., to Portland, Me.

•

BIRMINGHAM — With the sharp decline in shipbuilding activity, shipyard scrap, a substantial supply source for this market during the war years, has practically disappeared. A few lots of ordnance scrap are being offered with most of this material going to Northern and Eastern consumers.

•

TORONTO—With dealers and consumers depending largely on industrial plants to provide scrap for current needs, the available supply is less than 50 pct of actual requirements. While steel mills have not yet had to face a critical shortage, they rapidly are coming to the end of their resources as there has been heavy withdrawal from stockpiles to meet requirements over the past several months. Only occasional deliveries are reported from rural communities and the mining centers and Western Canada scrap has started to dry up due to transportation problems. Cast scrap and stove plate are in critical short supply and dealers are not obtaining sufficient to meet requirements of foundry and other melters. Local dealers report large volume of light scrap requiring baling and while the bulk is large, the tonnage is small.

•

Acquires Brokerage Firms

Chicago

• • • **Erman-Howell & Co.,** Chicago iron and steel scrap brokers, and Philip W. Frieder Co. of Cleveland, have been acquired by the Luria Steel & Trading Corp. The Chicago and Cleveland firms will operate as divisions of Luria Steel.

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages. Where asterisks are used on quotations below, this indicates a ceiling price to which must be added brokerage fee and adjusted freight.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
RR. hvy. melting	21.00*
No. 2 hvy. melting	20.00*
RR. scrap rails	21.50*
Rails 3 ft. and under	23.50*
No. 1 comp'd sheets	20.00*
Hand bdld. new shts.	20.00*
Hvy. axle turn.	19.50*
Hvy. steel forge turn.	19.50*
Mach. shop turn.	15.00*
Short shov. turn.	17.00*
Mixed bor. and turn.	15.00*
Cast iron borings	16.00*
Hvy. break cast.	16.50*
No. 1 cupola	20.00*
RR. knuck. and coup.	24.50*
RR. coil springs	24.50*
Rail leaf springs	24.50*
Rolled steel wheels	24.50*
Low phos. bil. crops	25.00*
Low phos.	22.50*
RR. malleable	22.00*

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 1 bundles	18.75*
No. 2 dealers' bndls.	18.75*
Bundled mach. shop turn.	18.75*
Galv. bundles	16.75*
Mach. shop turn.	13.75*
Short shovels, turn.	15.75*
Cast iron borings	14.75*
Mix. borings & turn.	13.75*
Low phos. hvy. forge	23.75*
Low phos. plates	21.25*
No. 1 RR. hvy. melt.	19.75*
Reroll rails	22.25*
Miscellaneous rails	20.25*
Angles & splice bars	22.25*
Locomotive tires, cut	24.25*
Cut bolsters & side frames	22.25*
Standard stl. car axles	25.75*
No. 3 steel wheels	23.25*
Couplers & knuckles	23.25*
Agricul. malleable	22.00*
RR. malleable	22.00*
No. 1 mach. cast.	20.00*
Rails 3 ft. and under	22.25*
No. 1 agricul. cast.	20.00*
Hvy. breakable cast.	16.50*
RR. grate bars	15.25*
Cast iron brake shoes	15.25*
Stove plate	19.00*
Clean auto cast.	20.00*
Cast iron carwheels	20.00*

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
No. 1 bundles	19.50*
No. 2 bundles	19.50*
Mach. shop turn.	$10.50 to 11.00
Shoveling turn.	12.50 to 13.00
Cast iron borings	11.50 to 12.00
Mixed bor. & turn.	11.50 to 12.00
Low phos. plate	22.00*
No. 1 cupola cast.	20.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Scrap rails	21.00*

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$15.05*
No. 2 hvy. melting	15.05*
Nos. 1 and 2 bundles	15.05*
Busheling	15.05*
Turnings, shovelings	12.05*
Machine shop turn.	10.05*
Mixed bor. & turn.	10.05*
Cl'n cast. chem. bor.	$13.06 to 14.15*
Machinery Cast.	20.00*
Breakable cast.	16.50*
Stove plate	19.00*

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	$17.32*
No. 2 hvy. melting	17.32*
No. 1 bundles	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	12.32*
Short shov. turn.	14.32*
Cast iron borings	13.32*
Mixed bor. & turn.	12.32*
Low phos. plate	19.82*
No. 1 cupola cast.	20.00*
Charging box cast.	19.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Automotive cast.	20.00*

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 2 bundles	18.75*
Mach. shop turn.	13.75*
Shoveling turn.	15.75*
Cast iron borings	14.75*
Mixed bor. & turn.	13.75*
No. 1 cupola cast.	20.00*
Hvy. breakable cast.	16.50*
Cast, charging box	19.00*
Hvy. axle forge turn.	18.25*
Low phos. plate	21.25*
Low phos. punchings	21.25*
Billet crops	21.25*
RR. steel wheels	23.25*
RR. coil springs	23.25*
RR. malleable	22.00*

ST. LOUIS

Per gross ton delivered to consumer:

Heavy melting	$17.50*
Bundled sheets	17.50*
Mach. shop turn.	12.50*
Locomotive tires, uncut.	$18.50 to 19.00
Misc. std. sec. rails	19.00*
Rerolling rails	21.00*
Steel angle bars	21.00*
Rails 3 ft and under	21.50*
RR. springs	22.00*
Steel car axles	24.50*
Stove plate	19.00*
Grate bars	15.25*
Brake shoes	15.25*
RR. malleable	22.00*
Cast iron carwheels	20.00*
No. 1 mach'ery cast	20.00*
Breakable cast.	16.50*

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.00*
No. 2 hvy. melting	17.00*
No. 2 bundles	17.00*
No. 1 busheling	17.00*
Long turnings	12.00*
Shoveling turnings	14.00*
Cast iron borings	13.00*
Bar crops and plate	$18.50 to 19.50*
Structural and plate	18.50 to 19.50*
No. 1 cast	20.00*
Stove plate	19.00*
Steel axles	18.50*
Scrap rails	18.50
Rerolling rails	20.50*
Angles & splice bars	20.50 to 21.00
Rails 3 ft. & under	21.00*
Cast iron carwheels	17.50 to 18.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
No. 2 hvy. melting	20.00*
Low phos. plate	22.50*
No. 1 busheling	20.00*
Hydraulic bundles	20.00*
Mach. shop turn.	15.00*
Short shovel. turn.	17.00*
Cast iron borings	16.00*

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$15.33*
No. 2 hvy. melting	15.33*
Comp. black bundles	15.33*
Comp. galv. bundles	13.33*
Mach. shop turn.	10.33*
Mixed bor. & turn.	10.33*
Shoveling turn.	12.33*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Charging box cast	19.00*
Stove plate	19.00*
Clean auto cast	20.00*
Unstrip. motor blks.	17.50*
Cl'n chem. cast bor.	14.33*

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.25*
No. 1 bundles	19.25*
No. 2 bundles	19.25*
No. 2 hvy. melting	19.25*
Mach. shop turn.	14.25*
Shoveling turn.	16.25*
Cast iron borings	14.25*
Cast iron borings	15.25*
Mixed bor. & turn.	14.25*
Stove plate	19.00*
Low phos. plate	21.75*
Scrap rails	20.75*
Rails 3 ft. & under	22.75*
RR. steel wheels	23.75*
Cast iron car wheels	20.00*
RR. coil & leaf spgs.	23.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
Compressed sheet stl.	19.50*
Drop forge flashings	19.00
No. 2 bundles	19.50*
Mach. shop turn.	14.50*
Short shovel.	16.50*
No. 1 busheling	19.50*
Steel axle turn.	19.00*
Low phos. billet and bloom crops	24.50*
Cast iron borings	15.50*
Mixed bor. & turn.	14.50*
No. 2 busheling	17.00*
No. 1 machine cast	20.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	19.00*
RR. hvy. melting	20.50*
Rails 3 ft. & under	23.00*
Rails 18 in. & under	24.25*
Rails for rerolling	23.00*
Railroad malleable	22.00*
Elec. furnace punch	22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:

RR. hvy. melting	$18.00*
No. 1 hvy. melting	17.00*
No. 2 hvy. melting	17.00*
No. 2 bales	$15.00 to 15.75
No. 3 bales	8.50 to 9.25
Mach. shop turn.	6.50 to 7.25
Elec. furn. 1 ft. und.	15.50 to 17.00
No. 1 cupola cast	19.00 to 21.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.00
No. 2 hvy. melting	17.00
No. 1 bales	$16.00 to 16.75
No. 2 bales	15.00 to 15.75
No. 3 bales	8.00 to 9.00
Mach. shop turn.	7.00
No. 1 cupola cast.	19.00 to 21.00

SEATTLE

Per gross ton delivered to consumer:

RR. hvy. melting	$14.50*
No. 1 & No. 2 hvy. melting	14.50*
Elec. furn. 1 ft. und.	$14.00 to 15.00
No. 1 cupola cast.	20.00*

HAMILTON, ONT.

Per gross ton delivered to consumer:

Heavy melting	$17.50*
No. 1 bundles	17.50*
No. 2 bundles	17.00*
Mixed steel scrap	15.50*
Rails, remelting	18.50*
Rails, rerolling	21.50*
Bushelings	13.00*
Mixed borings & turnings	12.50*
Electric furnace bundles	20.50*
Manganese steel scrap	20.00*
No. 1 cast	19.00*
Stove plate	17.50*
Car wheels, cast	19.50*
Malleable iron	16.00*

Comparison of Prices . .

Advances over past week in **Heavy Type**; declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	June 25, 1946	June 18, 1946	May 21, 1946	June 26, 1945
Hot-rolled sheets	2.425	2.425	2.425	2.20
Cold-rolled sheets	3.275	3.275	3.275	3.05
Galvanized sheets (24 ga.)	4.05	4.05	4.05	3.70
Hot-rolled strip				
6-in. and under	2.45	2.45	2.45	2.10
Over 6 in.	2.35	2.35	2.35	2.10
Cold-rolled strip	3.05	3.05	3.05	2.80
Plates	2.50	2.50	2.50	2.25
Plates, wrought iron	4.112	4.112	4.112	3.80
Stain's c-r strip (No. 302)	30.30	30.30	30.30	28.00
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tinplate, electro (0.50 lb)	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.55	4.55	4.55	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.50	2.50	2.50	2.25
Cold-finished bars	3.10	3.10	3.10	2.65
Alloy bars	2.92	2.92	2.92	2.70
Structural shapes	2.35	2.35	2.35	2.10
Stainless bars (No. 302)	25.97	25.97	25.97	24.00
Wrought iron bars	4.76	4.76	4.76	4.40
Wire and Wire Products: (cents per pound)				
Pright wire	3.05	3.05	3.05	2.75
Wire nails	3.75	3.75	3.25	2.90
Rails: (dollars per net ton)				
Heavy rails	$43.39	$43.39	$43.39	$43.00
Light rails	49.18	49.18	49.18	45.00
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$39.00	$39.00	$39.00	$36.00
Sheet bars	38.00	38.00	38.00	36.00
Slabs, rerolling	39.00	39.00	39.00	36.00
Forging billets	47.00	47.00	47.00	42.00
Alloy blooms, billets, slabs	58.43	58.43	58.43	54.00
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.30	2.30	2.30	2.15
Skelp	2.05	2.05	2.05	1.90

Pig Iron*: (per gross ton)	June 25, 1946	June 18, 1946	May 21, 1946	June 26, 1945
No. 2 foundry, Phila.	$28.34	$28.34	$28.34	$26.84
No. 2, Valley furnace	26.50	26.50	26.50	25.00
No. 2, Southern, Cin'ti	26.94	26.94	26.94	25.44
No. 2, Birmingham	22.88	22.88	22.88	21.38
No. 2 foundry, Chicago†	26.50	26.50	26.50	25.00
Basic, del'd eastern Pa.	27.84	27.84	27.84	26.34
Basic, Valley furnace	26.00	26.00	26.00	24.50
Malleable, Chicago†	26.50	26.50	26.50	25.00
Malleable, Valley	26.50	26.50	26.50	25.00
L. S. charcoal, Chicago	42.34	42.34	42.34	42.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 60¢ per ton.
‡ For cariots at seaboard.
*Subject to retroactive adjustment by OPA.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	17.32
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$7.50	$7.50	$7.50	$7.50
Foundry coke, prompt	9.00	9.00	9.00	9.00
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	14.375	14.375	12.00	12.00
Copper, Lake	14.375	14.375	12.00	12.00
Tin, Straits, New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	8.10	8.10	6.35	6.35
Aluminum, virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
June 25, 1946	2.72115¢ per lb.	$26.12 per gross ton	$19.17 per gross ton
One week ago	2.72115¢ per lb.	$26.12 per gross ton	$19.17 per gross ton
One month ago	2.72115¢ per lb.	$26.12 per gross ton	$19.17 per gross ton
One year ago	2.42471¢ per lb.	$24.61 per gross ton	$19.17 per gross ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1946	2.72115¢ Apr. 2	2.54490¢ Jan. 1	$26.12 Mar. 19	$25.37 Jan. 1	$19.17	$19.17
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2	25.37 Oct. 23	23.61 Jan. 2	$19.17 Jan. 2	$18.92 May 22
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢	2.29176¢	23.61	23.61	$19.17	$19.17
1942	2.28249¢	2.28249¢	23.61	23.61	19.17	19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 3

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Smart modern designs for garden furniture, lawn mowers, wheel barrows, bicycles and other home utilities can be enhanced by use of J&L Electricweld Tubing. Its smooth, uniform surface provides an ideal base for painting, enameling and electro-plating, and most important its inherent strength and quality permits you to build with a minimum of weight—to sell the public with ease. Also J&L Electricweld Tubing will work smoothly in your bending, fabricating and welding operations.

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PENNSYLVANIA

Iron and Steel Prices...

Steel prices shown here are f.o.b. basing points, in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. (1) Mill run sheet, 10¢ per 100 lb under base; primes, 25¢ above base. (2) Unassorted commercial coating. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25¢ per 100 lb to fabricators. (8) Also shafting. For quantities of 20,000 lb to 39,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (11) Boxed. (12) This base price for annealed, bright finish wires, commercial spring wire. (13) Produced to dimensional tolerances in AISI Manual Sect. 6. (14) Billets only. (15) 9/32 in. to 47/64 in., 0.15¢ per lb higher. Alloy price increases are retroactive to Feb. 15. (16) OPA ceiling prices on tinplate are 25¢ per base box higher.

Basing Points	Pitts-burgh	Chicago	Gary	Cleve-land	Birm-ingham	Buffalo	Youngs-town	Spar-rows Point	Granite City	Middle-town, Ohio	Gulf Ports, Cars	10 Pacific Ports, Cars	DELIVERED TO Detroit	New York	Phila-delphia
INGOTS															
Carbon, rerolling	($33.00 f. o. b. mill)														
Carbon, forging	$38	$38	$38	$38	$38	$38	$38								
Alloy	$48.69	$48.69				$48.69	(Bethlehem, Massillon, Canton, Coatesville=$48.69)								
BILLETS, BLOOMS, SLABS															
Carbon, rerolling	$39	$39	$39	$39	$39	(Provo=$50.20, Duluth=$41[14]) $39	$39	$39				$51[14]	$41		
Carbon, forging billets	$47	$47	$47	$47	$47	(Provo=$58.20, Duluth=$49[14]) $47	$47					$59[14]	$49		
Alloy	$58.43	$58.43				$58.43	(Bethlehem, Massillon, Canton=$58.43)						$60.59		
SHEET BARS	$38	$38		$38		$38	$38	$38	(Canton=$38)						
PIPE SKELP	2.05¢	2.05¢					2.05¢	2.05¢	(Coatesville=2.05¢)						
WIRE RODS [15] No. 5 to 9/32 in.	2.30¢	2.30¢		2.30¢	2.30¢	(Worcester=2.40¢)					2.55¢	2.80¢			
SHEETS															
Hot-rolled	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.525¢	2.425¢		2.975¢	2.525¢	2.665¢	2.595¢
Cold-rolled[1]	3.275¢	3.275¢	3.275¢	3.275¢		3.275¢	3.275¢		3.375¢	3.275¢		3.925¢	3.375¢	3.615¢	3.595¢
Galvanized (24 gage)	4.05¢	4.05¢	4.05¢		4.05¢	4.05¢	4.05¢	4.05¢	4.15¢	4.05¢		4.60¢		4.29¢	4.22¢
Enameling (20 gage)	3.80¢	3.80¢	3.80¢	3.80¢			3.80¢		3.90¢	3.80¢		4.45¢	3.90¢	4.16¢	4.12¢
Enameling (10 Gage)	3.20¢	3.20¢	3.20¢	3.20¢			3.20¢		3.30¢	3.20¢		3.85¢	3.30¢		
Long ternes [2]	4.05¢	4.05¢	4.05¢									4.80¢		4.41¢	4.37¢
STRIP															
Hot-rolled [3] 6 in. and under	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢		2.45¢			2.45¢		3.10¢	2.55¢	2.81¢	2.77¢
Hot-rolled [3] over 6 in.	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢		2.35¢			2.35¢		3.00¢	2.45¢	2.71¢	2.67¢
Cold-rolled [4]	3.05¢	3.15¢		3.05¢			3.05¢	(Worcester=3.25¢)					3.15¢	3.41¢	3.37¢
Cooperage stock	2.55¢	2.55¢			2.55¢		2.55¢							2.91¢	
Commodity cold-rolled	3.20¢	3.30¢		3.20¢			3.20¢	(Worcester=3.60¢)					3.30¢	3.56¢	
TINPLATE [16]															
Standard cokes, base box	$5.00	$5.00	$5.00		$5.10			$5.10	$5.10					$5.604[11]	$5.53[11]
Electro, box 0.25 lb	$4.35	$4.35	$4.35					$4.35							
Electro, box 0.50 lb	$4.50	$4.50	$4.50					$4.60	$4.60						
Electro, box 0.75 lb	$4.65		$4.65					$4.75	$4.75						
BLACKPLATE 29 gage [5]	3.30¢	3.30¢	3.30¢					3.40¢	3.40¢						3.67¢
TERNES, MFG. Special coated, base box	$4.55	$4.55	$4.55					$4.65	$4.65						
BARS									(Duluth=2.80¢)						
Carbon steel	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	(Provo, Utah=3.20¢)			2.85¢	3.15¢	2.60¢	2.84¢	2.82¢
Rail steel [6]	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢					2.85¢	3.15¢			
Reinforcing (billet) [7]	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢			2.70¢	2.75¢	2.45¢	2.59¢	2.67¢
Reinforcing (rail) [7]	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢				2.70¢	2.75¢	2.45¢		2.57¢
Cold-finished [8]	3.10¢	3.10¢	3.10¢	3.10¢		3.10¢	(Detroit=3.15¢)			(Toledo=3.25¢)				3.44¢	3.42¢
Alloy, hot-rolled	2.92¢	2.92¢				2.92¢	2.92¢	(Bethlehem Massillon, Canton=2.92¢)					3.03¢		
Alloy, cold-drawn	3.62¢	3.62¢	3.62¢	3.62¢		3.62¢							3.73¢		
PLATE								(Coatesville and Claymont=2.50¢, Provo, Utah=3.20¢)							
Carbon steel [13]	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢		2.50¢	2.50¢			2.85¢	3.05¢	2.72¢	2.69¢	2.55¢
Floor plates	3.75¢	3.75¢									4.10¢	4.40¢		4.11¢	4.07¢
Alloy	3.79¢	3.79¢			(Coatesville=3.79¢)						4.27¢	4.49¢		4.00¢	3.88¢
SHAPES Structural	2.35¢	2.35¢	2.35¢		2.35¢	2.35¢	(Bethlehem=2.35¢)				2.60¢	3.00¢		2.52¢	2.465¢
SPRING STEEL, C-R															
0.26 to 0.50 carbon	2.80¢			2.80¢			(Worcester=3.20¢)								
0.51 to 0.75 carbon	4.30¢			4.30¢			(Worcester=4.50¢)								
0.76 to 1.00 carbon	6.15¢			6.15¢			(Worcester=6.35¢)								
1.01 to 1.25 carbon	8.35¢			8.35¢			(Worcester=8.55¢)								
WIRE [9]															
Bright [12]	3.05¢	3.05¢		3.05¢	3.05¢		(Worcester=3.15¢)			(Duluth=3.10¢)		3.55¢			3.37¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	4.00¢	4.00¢		4.00¢			(Worcester=4.10¢)					4.50¢			4.32¢
PILING Steel sheet	2.65¢	2.65¢				2.65¢						3.20¢			2.97¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

BASING POINT	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	22.99	24.67	17.01	17.47	20.69	25.29
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	22.99	24.67	17.01	17.47	20.69	25.29
Billets P'gh, Chi, Canton, Newark, N. J., Watervliet, Syracuse, Balt.	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Watervliet, Syracuse, Newark, N. J., Ft. Wayne, Titusville	22.99	24.67	17.01	17.47	20.69	25.29
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	27.05	25.97	20.02	20.56	24.34	29.75
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	27.05	25.97	20.02	20.56	24.34	29.75
Plates, P'gh, Middletown, Canton	31.38	29.21	23.28	23.80	28.67	33.00
Shapes, structural, P'gh, Chi	27.05	25.97	20.02	20.56	24.34	29.75
Sheets, P'gh, Chi, Middletown, Canton, Balt.	38.95	36.79	28.67	31.38	35.16	38.49
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.43	23.28	18.39	18.93	25.97	37.87
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	32.46	30.30	23.80	24.34	34.62	56.26
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila.	27.05	25.97	20.02	20.56	24.34	29.75
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	32.46	30.30	23.80	24.34	34.62	56.26
Rod, h-r, Newark, N. J., Syracuse	27.05	25.97	20.02	20.56	24.34	29.75
Tubing, seamless, P'gh, Chi, Canton, (4 in. to 6 in.)	72.09	72.09	.....	68.49	.....	.....

SHELL STEEL

	per gross ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic openhearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

*Prices delivered Detroit are $2.00 higher; East Michigan, $3 higher.

Price Exceptions: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	per lb
Field grade	3.90¢
Armature	4.25¢
Electrical	4.75¢
Motor	5.425¢
Dynamo	6.125¢
Transformer 72	6.625¢
Transformer 65	7.625¢
Transformer 58	8.125¢
Transformer 52	8.925¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo. Pacific ports add 75¢ per 100 lb on all grades.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb No. 1 O.H., net ton	$43.39
Angle splice bars, 100 lb	2.85
(F.o.b. basing points)	*per net ton*
Light rails (from billets)	$49.18
Light rails (from rail steel)	49.18
	base per lb
Cut spikes	3.65¢
Screw spikes	5.55¢
Tie plate, steel	2.55¢
Tie plates, Pacific Coast	2.70¢
Track bolts	*4.75¢
Track bolts, heat treated, to railroads	*5.00¢
Track bolts, jobbers discount	63-5

*Plus an increase of 7 pct.

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25¢.

TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, O.)*

An increase of 8.2 pct applies to base price and extras

	Base per lb
High speed	67¢
Straight molybdenum	54¢
Tungsten-molybdenum	57½¢
High-carbon-chromium*	43¢
Oil hardening*	24¢
Special carbon*	22¢
Extra carbon*	18¢
Regular carbon*	14¢

Warehouse prices on and east of Mississippi are 2¢ per lb higher; west of Mississippi 3¢ higher.

CLAD STEEL

Base prices, cents per pound

	Plate	*Sheet*
Stainless-clad		
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Pa.	21.00*	22.00
Nickel-clad		
10 pct, f.o.b. Coatesville, Pa.	18.72	....
Inconel-clad		
10 pct, f.o.b. Coatesville	26.00	....
Monel-clad		
10 pct, f.o.b. Coatesville	24.96	....
Aluminized steel		
Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

*Includes annealing and pickling.

WIRE PRODUCTS

To the dealer, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	*Pacific Coast Basing Points†*
	base per keg	
Standard wire nails	$3.75	$4.25
Coated nails	3.75	4.25
Cut nails, carloads	4.85	....
	base per 100 lb	
Annealed fence wire	$3.50	$4.00
Annealed galv. fence wire	3.85	4.35
	base column	
Woven wire fence*	72	90
Fence posts, carloads	74	91
Single loop bale ties††	72	97
Galvanized barbed wire**	79	89
Twisted barbless wire	79	89

*15½ gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

††Add 50c a ton.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$8.50	$17.00
15-lb coating I.C.	9.50	19.00
20-lb coating I.C.	10.00	20.00

ALLOY EXTRAS

Alloy Steel	Basic Openhearth		Electric Furnace	
	Bars and Bar-strip	Billets, Blooms and Slabs	Bars and Bar-strip	Billets, Blooms and Slabs
A 8600	0.676¢	$13.52	1.196¢	$23.92
A 8700	0.728	14.56	1.248	24.96
NE 9400	0.780	15.60	1.300	26.00
NE 9700	0.676	13.52	1.196	23.92
NE 9800	1.352	27.04	1.872	37.44
NE 9900	1.248	24.96	1.612	32.24

The extras shown are in addition to the base price of $2.92 per 100 lb on finished products and $58.43 per gross ton on semifinished steel, major basing points, as shown in table, opposite page, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. When acid openhearth is specified and acceptable, add to basic openhearth alloy differential 0.27¢ per lb for bars and bar-strip and $5.14 per gross ton for billets, blooms and slabs. Alloy price increases are retroactive to Mar. 1.

WELDED PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh district and Lorain, Ohio, mills

(F.o.b. Pittsburgh only on wrought pipe) base price—$200.00 per net ton

Steel (buttweld)

	Black	Galv.
½-in.	60½	48
¾-in.	63½	52
1-in. to 3-in.	65½	54½

Wrought Iron (buttweld)

½-in.	17⅞	+4⅜
¾-in.	24¼	2⅝
1-in. and 1¼-in.	28⅝	9⅛
1½-in.	33	11⅞
2-in.	32⅜	11⅜

Steel (lapweld)

2-in.	58	46½
2½-in. and 3-in.	61	49½
3½-in. to 6-in.	63	51½

Wrought Iron (lapweld)

2-in.	24⅞	4⅞
2½-in. to 3½-in.	25⅞	7½
4-in.	28⅛	11⅜
4½-in. to 8-in.	27	10¼

Steel (butt, extra strong, plain ends)

½-in.	58½	47½
¾-in.	62½	51½
1-in. to 3-in.	64	54

Wrought Iron (same as above)

½-in.	18⅞	+1⅝
¾-in.	25⅝	4¾
1-in. to 2-in.	33	13

Steel (lap, extra strong, plain ends)

2-in.	56	45½
2½-in. and 3-in.	60	49½
3½-in. to 6-in.	63½	53

Wrought Iron (same as above)

2-in.	28⅛	8⅝
2½-in. to 4-in.	34	16¼
4½-in. to 6-in.	32⅜	14⅝

On buttweld and lapweld steel pipe jobbers are granted a discount of 5 pct. On l.c.l. shipments prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lapweld and one point lower discount, or $2 a ton higher on all buttweld.

BOILER TUBES

Seamless steel and lapweld commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft f.o.b. Pittsburgh, in carload lots

	Seamless Cold-Drawn	Seamless Hot-Rolled	Lapweld, Hot-Rolled
2 in. O.D. 13 B.W.G.	16.52	13.90	13.20
2½ in. O.D. 12 B.W.G.	22.21	18.70	17.67
3 in. O.D. 12 B.W.G.	24.71	20.79	19.56
3½ in. O.D. 11 B.W.G.	31.18	26.25	24.68
4 in. O.D. 10 B.W.G.	38.68	32.56	30.55

(Extras for less carload quantities)

40,000 lb or ft and over	Base
30,000 lb or ft to 39,999 lb or ft	5 pct
20,000 lb or ft to 29,999 lb or ft	10 pct
10,000 lb or ft to 19,999 lb or ft	20 pct
5,000 lb or ft to 9,999 lb or ft	30 pct
2,000 lb or ft or 4,999 lb or ft	45 pct
Under 2,000 lb or ft	65 pct

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago	$60.80
6-in. and larger, del'd New York	60.20
6-in. and larger, Birmingham	52.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles or Seattle	74.00

For all rail shipment; rail and water shipment less.

Class "A" and gas pipe, $3 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

An increase of 7 pct applies to all listings.

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

Percent Off List

½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
⅝ in. through 1 in.	..	60
9/16 in. through 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 pct additional discount.

Stove Bolts

Consumer

Packages, nuts loose	71 and 10
In packages	71
In bulk	80

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets
(½ in. and larger)

Base per 100 Lb

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $3.75

Small Rivets
(7/16 in. and smaller)

Percent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham ..... 65 and 5

Cap and Set Screws	*Percent Off List Consumer*
Upset full fin, hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Div. certifies in writing the consumers need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)*

Per Gross Ton

Old range, bessemer, 51.50	$5.45
Old range, non-bessemer, 51.50	5.30
Mesaba, bessemer, 51.50	5.20
Mesaba, non-bessemer, 51.50	5.05
High phosphorus, 51.50	5.05

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, cents per lb, ton lots.

Brass, minus 100 mesh	18.5¢ to 20.25¢
Copper, electrolytic, 150 and 200 mesh	21½¢ to 23½¢
Copper, reduced, 150 and 200 mesh	20½¢ to 25½¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe	11¢ to 16¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	4¢
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe, drum lots	63¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe	27¢ to 42¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	31¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢
Aluminum, 100 and 200 mesh	*25¢
Antimony, 100 mesh	30¢
Cadmium, 100 mesh	$1.40
Chromium, 100 mesh and finer	$1.25
Lead, 100, 200 & 300 mesh	11½ to 15¢
Manganese, minus 325 mesh and coarser	44¢ to 61¢
Nickel, 150 mesh	51½¢
Silicon, minus 325 mesh and coarser	26¢ to 55¢
Solder powder, 100 mesh	8½¢ plus metal
Tin, 100 mesh	58¾¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$2.60
Molybdenum powder, 99%, in 200-lb kegs, f.o.b. York, Pa., per lb	$2.60
Under 100 lb	$3.00

*Freight allowed east of Mississippi.

COKE

Subject to OPA retroactive adjustment.

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$7.50*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	9.00
Foundry, Byproduct	
Chicago, del'd	13.75
Chicago, f.o.b.	13.00
New England, deld	14.65
Kearny, N. J., f.o.b.	13.05
Philadelphia, del'd	13.28
Buffalo, del'd	13.40
Portsmouth, Ohio, f.o.b.	11.50
Painesville, Ohio, f.o.b.	12.15
Erie, del'd	13.15
Cleveland, del'd	13.20
Cincinnati, del'd	13.25
St. Louis, del'd	13.75†
Birmingham, del'd	10.90

*Hand drawn ovens using trucked coal permitted to charge $8.60 per ton plus transportation charges.

†Except producers situated in states other than Missouri, Alabama or Tennessee, sellers may charge a maximum delivered price of $14.25 in the St. Louis Mo., and East St. Louis, Ill., switching districts.

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

Per 1000

Super-duty brick, St. Louis	$76.05
First quality, Pa., Md., Ky., Mo., Ill., Ohio	60.40
First quality, New Jersey	65.90
Sec. quality, Pa., Md., Ky., Mo., Ill.	54.80
Sec. quality, New Jersey	57.70
Sec. quality, Ohio	52.95
Ground fire clay, net ton, bulk	8.95

Silica Brick*

Pennsylvania and Birmingham	$60.40
Chicago District	69.30
Silica cement, net ton (Eastern)	10.60

Chrome Brick	*Per Net Ton*
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick

Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. in bulk	22.00
in sacks	26.00

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP			Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
				Hot-Rolled										
	Hot-Rolled (10 gage)	Cold-Rolled	Galvanized (24 gage)	6 in. and Under	Over 6 in.	Cold-Rolled			Hot-Rolled	Cold-Finished	Hot-Rolled, A-8617-20	Hot-Rolled, A-8742-50 Ann.	Cold-Drawn, A-8617-20	Cold-Drawn, A-8742-50 Ann.
**Philadelphia	$3.743	$5.097	$5.218a	$4.272	$4.172	$5.022	$3.855	$3.916	$4.072	$4.522	$6.016	$7.116	$7.372	$3.422
New York	3.815	4.838[1]	5.46	4.324	4.224	5.024	4.018	4.008	4.103	4.553	6.058	7.158	7.403	8.453
Boston	3.999	4.969[3]	5.674	4.456	4.356	4.965	4.162	4.162	4.294	4.594	6.212	7.312	7.444	8.494
Baltimore	3.619	5.077	5.344	4.252	4.152	....	3.844	4.009	4.052	4.502	6.109	7.209	7.352	8.402
Norfolk	3.996	....	5.821	4.515	4.415	....	4.221	4.252	4.315	4.615	....	....	....	....
Chicago	3.475	4.425	5.581	3.95	3.85	4.95[6]	3.80	3.80	3.75	4.20	5.80	6.90	....	8.00
Milwaukee	3.612	4.562[1]	5.537	4.087	4.077	5.037[6]	3.937	3.937	3.887	4.337	6.037	7.037	7.197	8.237
Cleveland	3.575	4.625	5.327	3.95	3.85	4.76[6]	3.65	3.838	3.60	4.20	6.006	7.106	6.95	8.00
Buffalo	3.575	4.625	5.20	4.169	4.069	4.919[6]	3.88	3.65	3.60	4.20	5.80	6.90	6.95	8.00
Detroit	3.675	4.725	5.45	4.05	3.95	....	3.859	3.911	3.70	4.25	6.13	7.23	7.259	8.309
Cincinnati	3.65	4.70[1]	5.275	4.025	3.925	4.961	3.911	3.941	3.861	4.461	6.15	7.25	7.311	8.361
St. Louis	3.622	4.572[1]	5.581	4.097	3.997	5.181[6]	3.947	3.947	3.897	4.481	6.131	....	7.331	....
Pittsburgh	3.575	4.625	5.20	3.95	3.85	4.70	3.65	3.65	3.60	4.20	5.80	6.90	6.95	7.95
St. Paul	3.797	4.747	5.635	4.272	4.172	5.352	4.122	4.122	4.072	4.811	6.202	6.302	7.352	7.402
Omaha	4.018	5.668	5.965	4.493	4.393	....	4.343	4.343	4.293	4.893	....	....	....	....
Indianapolis	3.745	4.795	5.37	4.12	4.02	4.99	3.88	3.88	3.83	4.43	6.13	....	7.29	....
Birmingham	3.675	....	5.20	4.05	3.95	....	3.80	3.80	3.75	4.903	....	....	....	....
Memphis	4.19	4.885	5.715	4.565	4.465	....	4.315	4.315	4.265	4.78	....	....	....	....
New Orleans	4.283*	5.304	5.808	4.658	4.558	....	4.408	4.408*	4.358*	5.079	....	....	....	....
Houston	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Los Angeles	4.85	6.60[1]	6.55	5.30	5.20	....	4.80	4.70	4.65	6.03	....	....	....	....
San Francisco	4.12	6.87	6.35	4.60	4.50	4.15	4.15	4.15	4.30	5.78	....	....	....	....
Seattle	4.87[5]	7.27[2]	6.40	4.60	4.50	....	5.00[5]	4.70[5]	4.60[5]	6.23	....	....	....	....
Portland	4.87[4]	6.82[2]	6.20	5.10	5.00	....	5.00[4]	4.70[4]	4.70[4]	5.98	8.15	....	9.20	....
Salt Lake City	4.75	....	6.62[7]	5.88	5.78	....	5.23[7]	5.23[7]	5.13	6.35	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars, 1500 lb base.

NE ALLOY BARS: 1000 to 39,999 lb.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 450 to 3749 lb; (4) 300 to 4999 lb; (5) 300 to 10,000 lb; (6) 2000 lb and over; (7) 3500 lb and over.

(a) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

* Add 0.271¢ for sizes not rolled in Birmingham.

** City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

PIG IRON PRICES

Maximum per gross ton, subject to retroactive adjustment. Prices do not reflect 3 pct tax on freight.

BASING POINT PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	27.00	27.50	28.00	28.50	....
Birdsboro	27.00	27.50	28.00	28.50	32.00
Birmingham	21.50	22.88	.....	27.50	.....
Buffalo	25.50	26.50	27.00	27.50	32.00
Chicago	26.00	26.50	26.50	27.00	.....
Cleveland	26.00	26.50	26.50	27.00	.....
Detroit	26.00	26.50	26.50	27.00	.....
Duluth	26.50	27.00	27.00	27.50	.....
Erie	26.00	26.50	27.00	27.50	.....
Everett	27.00	27.50	28.00	28.50	.....
Granite City	26.00	26.50	26.50	27.00	.....
Hamilton	26.00	26.50	26.50	.....	.....
Neville Island	26.00	26.50	26.50	27.00	.....
Provo	24.00	24.50	.....	.....	.....
Sharpsville[1]	26.00	26.00	26.50	27.00	.....
Sparrows Point	27.00	27.50	.....	.....	.....
Steelton	27.00	.....	.....	.....	32.00
Swedeland	27.00	27.50	28.00	28.50	.....
Toledo	26.00	26.50	26.50	27.00	.....
Youngstown	26.00	26.50	26.50	27.00	.....

DELIVERED PRICES (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	0.50	27.50	28.00	28.50	29.00	....
Boston	Birdsboro-Steelton	4.02	.....	.....	.....	.....	38.02
Brooklyn	Bethlehem	2.50	29.50	30.00	30.50	31.00	.....
Brooklyn	Birdsboro	2.92	.....	.....	.....	.....	34.92
Canton	Clev, Ygstn, Sharpsvil.	1.39	27.39	27.89	27.89	28.39	.....
Canton	Buffalo	3.19	.....	.....	.....	.....	35.10
Cincinnati	Birmingham	4.06	25.56	26.94	.....	.....	.....
Cincinnati	Hamilton	1.11	.....	.....	27.61	.....	.....
Cincinnati	Buffalo	4.40	.....	.....	.....	.....	36.40
Jersey City	Bethlehem	1.53	28.53	29.03	29.53	30.03	.....
Jersey City	Birdsboro	1.94	.....	.....	.....	.....	33.94
Los Angeles	Provo	4.95	28.95	29.45	.....	.....	.....
Los Angeles	Buffalo	15.41	.....	.....	.....	.....	47.41
Mansfield	Cleveland-Toledo	1.94	27.94	28.44	28.44	28.94	.....
Mansfield	Buffalo	3.36	.....	.....	.....	.....	35.38
Philadelphia	Swedeland	0.84	27.84	28.34	28.84	29.34	.....
Philadelphia	Birdsboro	1.24	.....	.....	.....	.....	33.24
San Francisco	Provo	4.95	28.95	29.45	.....	.....	.....
San Francisco	Buffalo	15.41	.....	.....	.....	.....	47.41
Seattle	Provo	4.95	28.95	29.45	.....	.....	.....
Seattle	Buffalo	15.41	.....	.....	.....	.....	47.41
St. Louis	Granite City	0.50	26.50	27.00	27.00	27.50	.....
St. Louis	Buffalo	7.07	.....	.....	.....	.....	39.0

(1) Struthers Iron & Steel Co., Struthers, Ohio, may charge 50¢ per ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base prices for Lyles, Tenn., and Lake Superior furnaces, $33.00 and $34.00, respectively. Newberry Brand of Lake Superior charcoal iron $39.00 per g.t., f.o.b. furnace, by order L 39 to RPS 10. Apr. 11, 1945, retroactive to Mar. 7, 1945. Delivered to Chicago, $42.34. High phosphorus iron sells at Lyles, Tenn., at $28.50.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorous content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. Effective Mar. 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron and bessemer ferrosilicon up to and including 14.00 pct silicon covered by RPS 10 as amended. Silvery iron, silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$32.00; f.o.b. Buffalo—$33.25. Add $1.00 per ton for each additional 0.50 pct Si. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for prices of comparable analysis.

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk) $135.00
Less ton lots (packed) 148.50
F.o.b. Pittsburgh 139.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Briquets—cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk ..	6.05	6.30	6.60
Ton lots	6.65	7.55	8.55
Less ton lots ...	6.80	7.80	8.80

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50
F.o.b. Pittsburgh, Chicago	40.00	

Manganese Metal

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed.

96-98% Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk 30
L.c.l. lots 32

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads 32
Ton lots 34
Less ton lots 36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.10 max. C, 0.06% P, 90% Mn	21.00	21.40	21.65
0.10% max. C	20.50	20.90	21.15
0.15% max. C	20.00	20.40	20.65
0.30% max. C	19.50	19.90	20.15
0.50% max. C	19.00	19.40	19.65
0.75% max. C, 7.00% max. Si.....	16.00	16.40	16.65

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk 6.05
Ton lots 6.70
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet. 5.80
Ton lots 6.30
Less ton lots 6.55

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, $51.25 f.o.b. Keokuk, Iowa; $48.00 f.o.b. Jackson, Ohio; $49.25 f.o.b. Niagara Falls. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots, packed.

	Eastern	Central	Western
96% Si, 2% Fe..	13.10	13.55	16.50
97% Si, 1% Fe..	13.45	13.90	16.80

Ferrosilicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si.

	Eastern	Central	Western
Carload, bulk ..	3.60	3.75	3.90
Ton lots	4.05	4.55	4.60
Less ton lots...	4.45	4.80	4.85

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
50% Si	7.05	7.50	7.65
75% Si	8.55	8.70	9.25
90-90% Si	9.50	9.65	10.15
90-95% Si 11.80		11.95	12.40

Ferrochrome (65-72% *Cr, 2% max. Si*)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	23.00	23.40	24.00
0.10% C	22.50	22.90	23.50
0.15% C	22.00	22.40	23.00
0.20% C	21.50	21.90	22.50
0.50% C	21.00	21.40	22.00
1.00% C	20.50	20.90	21.50
2.00% C	19.50	19.90	20.50
66-71% Cr, 4-10% C ...	14.50	14.90	15.00
62-66% Cr, 5-7% C	15.05	15.45	15.55

Briquets — contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk ..	9.20	9.50	9.90
Ton lots	9.80	10.30	11.80
Less ton lots...10.10		10.60	12.10

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low-carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N. High-carbon type: 66.71% Cr, 4-5% C, 0.75% N. Add 5¢ per lb to regular high-carbon ferrochrome price schedule.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	15.60	16.00	16.10
Ton lots	16.65	17.30	18.50
Less ton lots.	17.30	17.95	19.15

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

	Eastern	Central	Western
Carload	20.00	20.40	21.00
Ton lots	21.00	21.65	22.85
Less ton lots ..	22.00	22.65	23.85

Chromium Metal

Contract prices, cents per lb, chromium contained, carload, f.o.b. shipping point, freight allowed. 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C..	83.50	85.00	86.25
0.50% max. C..	79.50	81.00	82.25
9.00% min. C..	79.50	81.00	82.25

Chromium—Copper

Contract price, cents per pound of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si.

Shot or ingot ..... 45¢

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	13.00	13.50	15.55
Ton lots	14.50	15.25	17.40
Less ton lots...	15.50	16.25	18.40

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	15.50	16.00	18.05
Ton lots	16.50	17.35	19.10
Less ton lots.	17.00	17.85	19.60

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1¢ for central zone; 5¢ for western zone.

	Cast	Turnings	Distilled
Ton lots	$1.35	$1.75	$4.25
Less ton lots..	1.60	2.00	5.00

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

	Eastern	Central	Western
Ton lots	12.00	12.75	14.75
Less ton lots.	12.50	13.25	15.25

Alloy 5: 50-56% Cr, 4-6% Mn, 13-50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

Ton lots	11.75	12.50	14.50
Less ton lots.	12.25	13.00	15.00

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe.

	Eastern	Central	Western
Ton lots	12.00	12.85	14.60
Less ton lots.	12.50	13.35	15.10

Other Ferroalloys

Ferrotungsten, standard, lump or ¼X down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained T, 5 ton lots, freight allowed.. $1.88

Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.

Openhearth	$2.70
Crucible	$2.80
High speed steel (Primos) ..	$2.90

Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, per pound contained V_2O_5 $1.10

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb.

Ton lots	$2.25
Less ton lots	$2.30

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo ..... 95¢

Calcium molybdate, 40-45%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo ..... 80¢

Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo ..... 80¢

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo ..... 80¢

Ferrotitanium, 40-45%, 0.10%C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti $1.23
Less ton lots $1.25

Ferrotitanium, 20-25%, 0.10%C max., ton lots, per pound contained Ti $1.35
Less ton lots $1.40

High-carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads $142.50

Ferrophosphorus, 18%, electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton $58.50

Ferrophosphorus, Electrolytic, 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton $75.00

Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.
Carloads lots ..... 14¢

Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy
Carload, bulk ..... 4.60¢

Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Niagara Falls, carload ..... 5.75¢
Ton lots ..... 7.25¢

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound
Car lots ..... 8.00¢
Ton lots ..... 8.75¢
Less ton lots ..... 9.25¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed.

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Less ton lots..	$1.30	$1.3075	$1.329

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots...	2.01	2.023	2.055

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots.	$2.10	$2.1125	$2.1445

Silcaz No. 3, contract basis, f.o.b. plant, freight allowed, per pound of alloy.

Carload lots	25¢
Ton lots	26¢

Silvaz No. 3, contract basis, f.o.b. plant, freight allowed, per pound of alloy.

Carload lots	58¢
Ton lots	59¢

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.

No. 1	87.5¢
No. 6	60¢
No. 79	45¢

Bortram, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound.....	50¢

Synthetic Fuel Oil Proved Successful By Extensive Tests

Washington

• • • **Plans for a** long term study of synthetic fuels in cooperation with the oil industry and engine manufacturers have been announced by the Navy, the world's largest consumer of oil. The Navy pointed out that the national security requires that every possible source of fuel be investigated to prevent development of shortages in times of emergency. The study will be made by the Navy Cooperative Committee on Fuels and Lubricants. A subcommittee composed of petroleum and engine manufacturers will work with the Navy in attempting to determine the properties of synthetic fuels and lubricants.

Announcement that the study will be made followed a full-scale demonstration of synthetic gasolines, diesel fuels and lubricants at the Naval Engineering Experiment Station, Annapolis, Md., conducted by Capt. D. H. Clar' USN, director of the station. R esentatives of science, industry, the Army and Navy witnessed the demonstration as part of a two-day seminar of the Army-Navy Petroleum Board, an agency of the Joint Chiefs of Staff.

The efficiency of synthetic fuels and blends of synthetic with natural fuels was demonstrated during the tests. The synthetic fuels, manufactured from natural gas, coal and shale, were used to operate landing craft, amphibious tanks, an experimental gas-turbine and turbo-jet engine.

The Navy began its study of synthetic fuels in 1944, when it was faced with a critical shortage of high-grade (50-cetane) diesel fuels. Laboratory studies indicated that a high cetane diesel fuel could be developed from natural gas, and that by blending the synthetic fuel with low-quality natural fuels the quality of the natural fuels could be increased to meet Navy specifications. Although the wartime shortage was solved by other means, the problem of finding ample supplies of high cetane diesel fuel still exists.

It may be necessary, the Navy said, to redesign present-day engines to take advantage of these properties, as the Navy must be prepared to utilize all sources of

fuels. The studies which the Navy is now undertaking with the cooperation of the oil industry and engine manufacturers will provide the factual data necessary to plan the design of engines capable of most efficient utilization of synthetic fuels.

The demonstration showed that blends of synthetic and natural fuels, and synthetic fuels alone, could be used to operate standard amphibious craft, small boats and vehicles. It represented the present state of development in the manufacture of synthetic fuels in the United States.

French Take Over Coal Mines, Set Up Method Of Payment to Owners

Paris

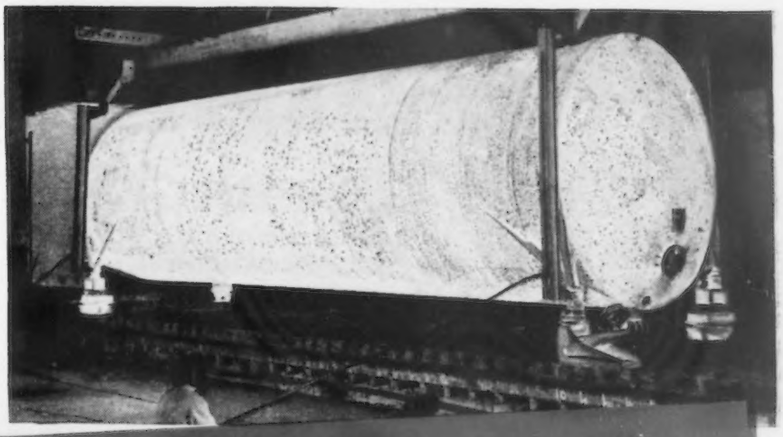
• • • **The French** Constituent Assembly has voted the coal industry nationalization bill. The 39 sections and the whole plan were agreed to in less than 3 hr.

Under the act the coal mines will be governed by a public board called "Charbonnages de France," its task being to coordinate and control production at home and overseas. In the different regions coal production and sales will be under district boards which will endeavor to avoid financial losses and will have the right to float loans to modernize equipment.

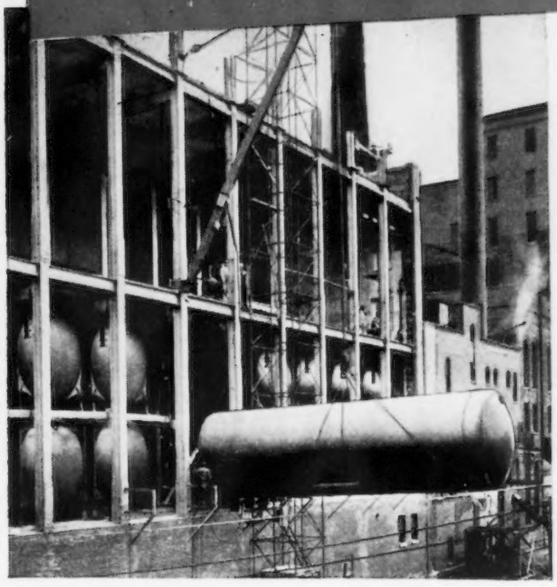
Transfer of ownership does not include auxiliary undertakings of a secondary nature. Indemnification of shareholders will be made by the Charbonnages de France. In the case of companies, compensation will be made to the shareholders on a pro rata basis according to the number of shares. Compensation to companies whose shares are dealt with on the stock exchange will be the equivalent of the result of capitalization on the basis of the average share price during the first six months of 1944. To this average price there will be applied a predetermined coefficient.

Payment will be effected by exchanging the shares for bonds of the Charbonnages de France which are negotiable and redeemable within 50 yr and can be either drawn or bought back. The administrative council of Charbonnages de France will fix a rate of interest every year, which must be lower than the divi-

1933 Thousands of man-hours of welding research went into development of a SMITHway Electrode over the weld of which glass coatings could successfully be applied. The result was production of this first large single-piece glass-lined tank, shown emerging white hot from the gigantic furnace.



Out of Welding Research... BETTER BEER



1946 Since the first SMITHway Glass-Lined Storage Tank was built in 1933, hundreds of brewers throughout the world have equipped their lagering cellars with SMITHway glass-lined tanks... a combined storage capacity of 39,486,188 gallons.

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New developments to fill every new need are always in the making at A. O. Smith—in the welding research laboratories, in the plants where more than 320,000 SMITHway Electrodes have been used in daily production.

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dend paid to the shareholders for the year 1944, nor must it be under 3 pct. Further interest will be paid depending on earnings.

Charbonnages de France will be under a council of 18 members appointed by the French Cabinet and consisting of six representatives of the state; six of the solid fuel consumers, and six of the staff, appointed on the advice of their trade unions. The director general will be elected from the industry. Every district board is under a council of 19 members. There are six representatives of the Charbonnages de France, six of economic interests, and seven representatives of the employees.

France is obliged to draw as much as possible on her own coal resources owing to the American miners' strike and insufficient supplies coming from other countries, mainly from the Ruhr district. The possibility of importing coal from Poland is being considered, as Poland within her new frontiers hopes to produce 55 million tons this year as against 39 million tons from her prewar territory. In former times France used to import about 1½ millions tons of coal annually from Poland, but transport has to be considered in this connection.

Adds to WAA Critical List For Urgent Material

Washington

• • • **Warm air furnaces;** certain types of plumbing fixtures; lead; convector radiation (extended surface); large power presses; copper magnet wire; and specialized machinery for tarred roofing products, gypsum board and lath, have been added to the list of critically scarce products for which producers may apply to CPA for urgency purchase certificates to purchase such goods from WAA.

Certificates are issued only when equipment is urgently needed to produce products listed in Schedule 1, PR 28. They are good for only 60 days and are honored by WAA in order of presentation. Applications are made on Form 4425, obtainable at the 71 District Construction Offices, but must be filed with the CPA Washington office.

Water Moves, Models Are Stationary at New D. W. Taylor Test Unit

Washington

• • • **A miniature** "ocean" in which ships' gear remains stationary while water is forced past it, is helping the U. S. Navy uncover new secrets of design to improve performance of its fighting ships.

Called a "circulating water channel," the latest test unit of the David W. Taylor Model Basin here sends 750,000 gal of water coursing, through an upright circular aqueduct and hurls it against ships' gear or scaled ship models in a reverse simulation of real equipment knifing its way through the ocean.

Two huge motors, especially designed by Westinghouse Electric Corp. engineers, furnish the power to roll 2800 tons of water along the channel at speeds as high as 12 mph against the gear or model. Yet surface water is kept flat to permit visibility of under-currents, while naval engineers also can watch turbulence from beneath or from either side through plate glass—much like observation is made of an airplane in an aeronautical wind tunnel.

Through the glass, the water's push against objects can be photographed, either with still camera or as a movie that provides an opportunity for slow-motion study, Navy officials said.

The circulating water channel is the first successful one of its kind. Two foreign nations previously attempted construction of test channels of this basic design to furnish accurate naval data.

"Many observations have been made in the past, by various methods, of the direction of flow of water along the surface of a ship model," declared Capt. Harold E. Saunders, U.S.N., technical director of the Taylor Model Basin. "But research in the flow in and around the boundary layer, away from the surface of models, has by no means kept pace with the need for more precise knowledge as to the behavior of water at varying distances below the surface.

The circulating water channel might be likened to a three-story building with the middle floor

sealed tight by walls of shafts which drop from third to first floor at either end. Thus is formed a rectangular aqueduct through which water is forced down one shaft, across the first floor area, up the shaft of the opposite end and across the third floor area.

To turn the water smoothly at corners, vanes have been inserted to guide it in an arc rather than letting it make a right angle turn which would disturb and slacken its rate of flow. As the water arrives at the test channel, an open area on the top, its surface is smoothed out.

Flowing swiftly but smoothly, the water then passes the ship gear tied in the channel while engineers, observing through the windows, can study the action of the water as it flows past the object being tested and photographers can record the action for future study.

Moving the 2,800 tons of water in the circuitous route at the 12-mile-per-hour speed requires two 1000 hp motors, the shafts of which are directly connected with huge impeller pumps. For short periods each motor can develop as much as 1750 hp. The giant blades of the pumps, situated in one of the vertical shafts of the water tunnel, force water in a continuous, steady flow around the 385 feet of the oval.

To get variable speeds of circulation in the water channel, engineers adapted another aeronautical principle to the operation. Constant speed motors seemed advisable, so the huge impeller pumps were fitted with variable-pitch blades. Then hollow shafts were built into the motors and inside these shafts, hydraulic equipment to operate the variable-pitch impellers was placed. In this manner the inertia of the great mass of water could first be attacked with the impeller blades cutting through it like knives, the pitch of the blades being gradually increased to force the water along the channel at greater speeds.

The two motors also were built with unusually large frames for their size, so that they properly spanned the pump walls.

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lation could not be of the usual hydro-electric type that supports only downward weight. At full load and normal speed of 80 rpm, the action of the impellers on the water would have pushed up on the motor shaft, causing the rotating element of the motor to rise. At standstill and at partial loads, reaction is downward. Westinghouse engineers solved this problem by installing self-aligning roller thrust-bearings to take both upward and downward thrust, an application which Navy officials declare has been completely successful.

A motor generator set, housed near the big motors, has a separate armature for furnishing variable-voltage direct current to special devices being tested in the channel.

No effort has been spared to keep the water in the channel clear so that photographic records of tests may be complete. Large filters permit passing of all the channel water through sand once each 28 hours. Special air exhausters which carry off air bubbles that may form during the water's surge are a part of the equipment.

Grant Fellowship For Industrial Waste Study

New Brunswick, N. J.

• • • **The National Lime Assn.** has established a fellowship at Rutgers University for a study of the treatment of industrial wastes.

The program is concerned with utilization of various lime products in the treatment of water wastes. An important phase of the work is the study of the use of lime in the treatment of pickling liquor such as is obtained from steel producing and fabricating plants. Particular emphasis is being placed on the difficult sludge problem that is associated with this neutralization. This sludge problem is of concern especially to the small industries and it is hoped that considerable information will be developed regarding means of producing low sludge volume, high rates of dewatering of sludge and rapid settling.

In addition to the work on pickling liquor a study is being made of the neutralization of the various types and mixtures of acids present in industrial waste products.

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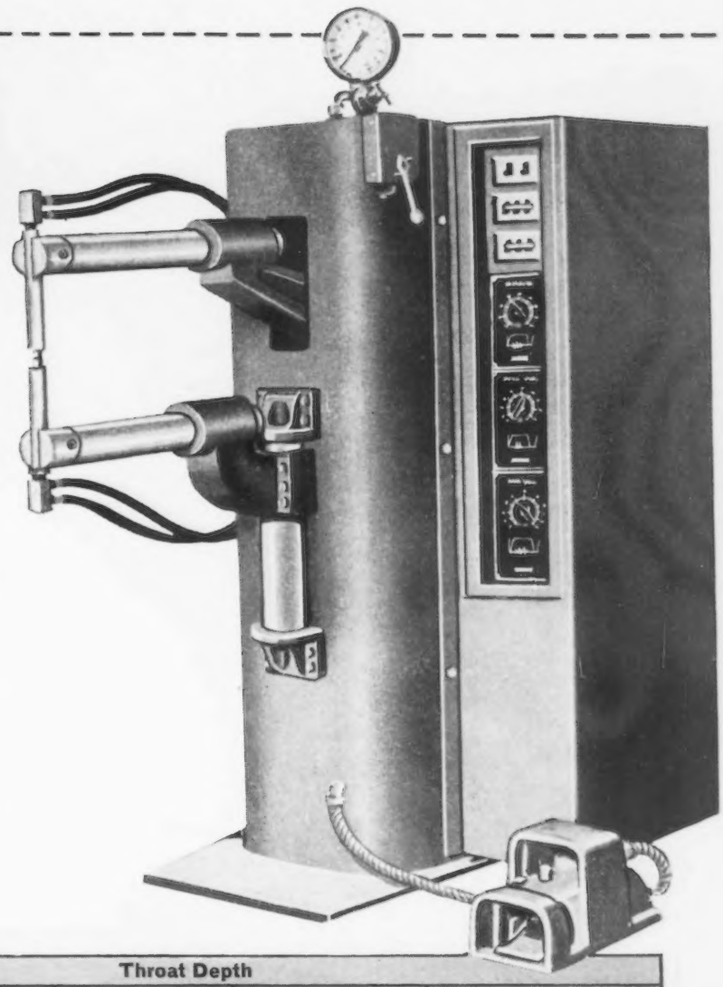

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The chart below gives maximum capacities on clean, mild steel under the various KVA and throat depth conditions. Minimum weldable gauge is 28. (U. S. Standard)

Transformer Rating	Throat Depth 12"	18"	24"	30"	36"
20 KVA	16 Gauge	18 Gauge	19 Gauge	22 Gauge	Not Supplied
30 KVA	14 Gauge	16 Gauge	18 Gauge	19 Gauge	22 Gauge
40 KVA	13 Gauge	14 Gauge	16 Gauge	18 Gauge	19 Gauge
50 KVA	12 Gauge	13 Gauge	14 Gauge	16 Gauge	18 Gauge
75 KVA	11 Gauge	12 Gauge	13 Gauge	14 Gauge	16 Gauge

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Engineers Committee Reveals Plan for Jap Industrial Disarmament

By KARL RANNELLS

Washington

• • • **Curtailment of Japan's** wartime rate of iron and steel production by more than 80 pct and the complete elimination of aluminum production facilities formed the nucleus of a 7-point program for industrial disarmament of that country as recommended to the State, War and Navy Dept. by the National Engineers Committee headed by Carlton S. Proctor.

This industrial limitation is not as drastic as might appear on first thought. In regard to iron and steel, the committee is actually recommending only that production be cut down from its wartime peak of 9 million metric tons annually to a tentative 1.6 million. This is in line with average peacetime production of around 1.62 million tons, including castings and forgings, for civilian uses.

As for aluminum, the Japanese home islands produce little bauxite or other ores necessary for its production and until cut off by the war blockades, imported large quantities of ingots. As a result, aluminum production required heavy subsidization from the government, a procedure not feasible for postwar Japan. In view of the certain economic loss in attempts at production, it is recommended that smelters and alumina producing plants be eliminated. Japan's civilian needs, tentatively estimated at about 4000 tons would be imported and a strict control exercised over the type and amount of goods manufactured.

The committee's specific recommendations covered seven fields:

Prohibition of experiments into atomic energy; strict regulation of scientific research with none along military lines; regulation of industrial construction; limitation of mineral and metal production; strict regulation of natural fuels and no synthetic production; and, reduction of electric power facilities to production for actual civilian needs.

Other recommendations were:

Magnesium: All production facilities to be removed or eliminated in view of the fact that the industry's history closely parallels that of aluminum, already given, except that magnesium production is economically feasible. Production rose from 700,000 lb in 1935 to 10,600,000 lb in 1944; needs would be controlled similar to those of aluminum.

Copper: Available statistics show that the civilian needs of this metal amount roughly to 70,000 tons annually but production rose to an average of more than 150,000 tons in the later war years. In order to provide the former peacetime quantity, it was recommended that copper smelting and refining capacities be reduced to no more than 85,000 tons a year.

Lead: The average annual production figure for 1935 through 1944 is about 78,000 tons. In the absence of reliable data prior to 1935, an arbitrary figure of 17,000 tons is set for civilian needs and production capacity of 20,000 tons recommended.

Tin: It is recommended that primary smelting capacity for tin ore be eliminated and only a small refinery capacity, about 750 tons, should be permitted for producing secondary metal from tin dross. In addition, an import quota of approximately 3500 tons would be permitted. Japanese production in 1940 was 1640 tons and imports 9840 tons as compared with 1931 when the figures were 1015 tons and 3257 tons, respectively.

Zinc: Recommendations were made that the present refinery capacity of 178,600 tons should be reduced to about 40,000 tons which would then be in approximate balance with mine production of 30,000 tons reported for the year 1943. Apparent consumption of zinc during the period 1935-44 averaged 76,000 tons, much of which was for war purposes.

Chemicals: These consist largely of nitrogen, sulphuric acid and calcium carbide and production was valued at around $400 million in 1937. Recommendations were that nitrogen production should be reduced from 560,000 tons (1944) to 180,000 for postwar years, pegging of sulphuric acid production at 3 million tons, and calcium carbide at 360,000 tons.

Based upon average require-

ments for the 1926-30 period, adjusted to meet current conditions, the total anticipated postwar need of 1.6 million tons of finished rolled steel products was derived by breaking down foreseeable requirements by consuming industries as follows:

Construction, 350,000 tons; automotive, 50,000 tons; rail transportation, 210,000 tons; metal containers, 180,000 tons; shipbuilding, secondary uses, 20,000 tons; mining, quarrying, lumbering, 40,000 tons; machinery, tools and equipment, both industrial and agricultural 350,000 tons; allowance for possible adjustments because of repatriation, 280,000 tons; and miscellaneous, 120,000 tons.

The apparent average consumption of steel products for the 5-year period of 1926-30, upon which the foregoing estimates were based, was 1,627,000 tons of which 1,538,000 tons were rolled steel and 89,000 tons were castings, forgings, etc. The rolled steel products were:

Rails, 210,000 tons; shapes, 229,000 tons; bars, 484,000 tons; sheets and tinplate, 91,000 tons; plates, 282,000 tons; wire, 76,000 tons; pipe and tube, 53,000 tons; and, others, 114,000 tons

A steel-making capacity of approximately 2.5 million tons will be required, the committee estimated, since the 1.6 million tons of finished rolled steel products is roughly equivalent to 2.3 million tons of ingots. By far, the largest part of this should be concentrated in three or four of the most efficient open hearth plants, operating in close proximity to blast furnaces and rolling mills, the engineers said.

It was further believed that there should be permitted the annual production of 1.5 million tons of pig iron, or about 65 pct of the ingot tonnage, in addition to 500,000 tons of foundry iron by the blast furnaces for castings. If in practice the supply of steel scrap is more than sufficient for the 2.3 million tons of ingots, the permissive amount of blast furnace iron would be decreased accordingly.

As a part of the total ingot production, some 230,000 tons would be allotted to electric furnaces, or an installed capacity of about 250,000 tons. Since there existed on VJ-Day about 3 million tons of such capacity, some 2.75 million tons of

this capacity would be destroyed.

No immediate recommendation was made concerning importation of scrap for steel-making purposes; this should be held in abeyance until needs are more clearly known on the basis of actual practice. An ample supply, if gathered and handled effectively, should be available for needs of the immediate future and possibly for some years.

With respect to the principal ferroalloys and alloying metals required for the different varieties of steel, the committee felt that permissive procedures should be optional. This would place the choice between importing these products, or importing in whole or in part the raw materials to be converted to metallics in Japan.

It is estimated that the 2.3 million ton ingot production will require approximately 21,000 tons of 75-pct ferromanganese and the equivalent of 6200 tons of 50-pct ferrosilicon. For production of alloy steels, an estimated 3000 tons to 3600 tons of contained chromium would be required and about 1000 tons to 1500 tons of nickel. A few hundred tons each of molybdenum, vanadium and tungsten are indicated.

Markets formerly dependent upon Japanese exports of steel products would have to look elsewhere for their supply. No exports would be permitted except to the extent of preventing serious disruption to the economies of those countries affected.

Japan is not well supplied quantitatively with ores and minerals although small amounts of many of them are present and most of them have been mined, usually on a limited scale. Local supplies were later supplemented by mining in conquered and occupied countries but in the main, Japanese metal industries have been built up on the basis of imported raw materials. For a number of years, manufacturing increases went into war and preparation for war.

By recommending reduction of steel-making facilities only by the amount of war expansions to indicate prewar civilian consumption, the committee leaves the way open to restoration of civil economy to Japan but accomplishes "positive and continuing military and industrial disarmament."

"Ruthless and indiscriminate destruction of all industry and of a sustaining national economy would defeat the re-establishment of peace," the report stated. "Leaving the nation to eke out a living on agriculture and fishing, if possible, would create social chaos and suffering of such magnitude that enforcement would be impossible."

Statistics on Japanese openhearth plants and capacities are as follows:

Plant	Annual Capacity in Metric Tons 1944	End of War
Nippon Seitetsu	500,000	300,000
Nippon Seiko	500,000	500,000
Total	1,000,000	800,000
HONSHU		
Nippon Seitetsu (Kamaishi)	587,000	287,000
Nippon Seitetsu (Fuji)	64,000	64,000
Nippon Kokan (Kawasaki)	610,000	200,000
Nippon Soda	37,000	37,000
Daido Seiko	80,000	80,000
Kotobuki Jukogyo	30,000	30,000
Yamato Seiko	167,000	60,000
Nakayama Seiko	229,000	229,000
Amagasaki Seitetsu	382,000	382,000
Azuma Seiko	122,000	122,000
Toyodo Sioko	15,000	15,000
Osaka Seiko	135,000	135,000
Nippon Seitetsu (Hirohata)	600,000	600,000
Nippon Kokan (Tsurmi)	380,000	380,000
Toho Seiko	40,000	40,000
Mitsubishi Seiko	41,000	41,000
Kawasaki Jyoko	526,000	526,000
Sumitomo Kingoko (Osaka)	128,000	128,000
Sumitomo Kingoko (Amagasaki)	180,000	135,000
Sumitomo Kingoko (Wakayama)	220,000	128,000
Kobe Seikosho	434,000	213,000
Toto Seiko	30,000	30,000
Naigi Seiko	22,500	22,500
Tokyo Seitetsu	40,800	40,800
Tokyshi Taura	90,000	90,000
Nichia Seko	144,000	144,000
Others	905,000	845,700
Total Honshu	6,240,000	5,000,000
KYUSHU		
Nippon Seitetsu (Yawata)	2,492,000	2,343,000
Asano Jukogyo	161,000	161,000
Mitsubishi Seiko	20,000	0
Total Kyushu	2,673,000	2,504,000
GRAND TOTAL	9,913,000	8,304,000

Electric Furnace Capacity: There are 762 Heroult electric furnaces, ranging from ½-ton to 20-ton capacity, whose total charging capacity is 3330 tons. There are also 119 high frequency induction furnaces, ranging from 1/10-ton to 5-ton capacity, whose total charging capacity is 95 tons. According to the SCRAP report "Materials Essential for Making War," dated Dec. 14, 1945, their annual capacities in metric tons are:

Location	1944	End of War
Hokkaido	39,000	39,000
Honshu	2,933,000	2,613,000
Kyushu	336,000	340,000
Total	3,308,000	2,892,000

Canada Plans to Ease Coal Supply by Upping Oil Burner Production

Toronto

• • • **The coal shortage** in Canada due to the sharp reduction in imports this year from the United States already has reached serious proportions and will become more critical later in the year unless speedy remedy is forthcoming. Through government cooperation it is planned to bring 1,000,000 tons into eastern Canada from Alberta and British Columbia compared with last year's rate of 500,000 tons. As a further step to relieve the coal shortage in Canada suggestions have been made from Ottawa regarding greater use of oil furnaces for heating purposes and with this in view steel priorities for the manufacture of oil heating equipment have been introduced. It is stated that to obtain full production of oil heating equipment a minimum of 20,000 tons of steel plate will be required before next winter, and this will absorb the entire output of the two Hamilton plate mills for 2 months. In addition there would be the sharp increase in steel demand for the making of oil burners, storage tanks and fuel trucks. It is apparent that the entire load of providing plate would fall on the Hamilton mills as no plate is now coming into Canada from the United States.

To save coal for heating and other domestic purposes, Canadian steel mills have had to curtail production and there has been a cutback in steel production by Algoma Steel Corp., Sault Ste. Marie, Ont., and Dominion Steel & Coal Co., Sydney, N. S., of approximately 25,000 tons per month, and this cutback is expected to last until next spring. Canada already is experiencing a serious steel shortage, a shortage that is holding peacetime manufacturing activities to less than 50 pct of rated capacity, and there is little prospect of relief in this direction until some time in 1947, and the delay may be further extended in the event of strikes among the three major producers in this country.

For the immediate future there seems little prospect of much relief with regard to steel supply from the United States. In the first

5 months of this year Canada imported only about 300,000 tons of steel from the United States as compared with an expected minimum of 400,000 tons. According to information gathered from various consuming interests the steel supply situation in Canada today is more critical than it was throughout the war years, and it also is more difficult to obtain supplies from the United States than it was during the war. The United States, also facing serious steel shortage, is not expected to be in a position to greatly stimulate exports into Canada, and in some quarters the opinion is that they may be further reduced.

Canadian steelmakers are making little headway in cleaning up old orders, as a matter of fact present backlogs are sufficient to absorb practically all production to the end of third quarter and some mills are declining further bookings and are not opening their books for third quarter business. On steel sheets, bars and nails, a critical situation has developed and any business now being booked is on an indefinite future delivery basis. However, mills are maintaining deliveries to customers and warehouses on a monthly basis but are unable to increase tonnages involved in these quotas. Building projects of all classes are being held up and manufacturing operations are far below earlier expected schedules.

Steel Export Tonnage Was Nearly 36 Million For 5-Yr War Period

• • • **Nineteen forty-five** was the peak wartime year for exports of iron and steel from the United States, when 7,911,711 net tons were shipped to foreign users, according to figures compiled by the American Iron & Steel Institute, based on reports by the Dept. of Commerce. These figures include lend-lease tonnages and, in some cases, steel that was sent overseas for the use of our military forces.

Last year was also the second highest export year in the industry's history, topped only by record shipments in 1940 of 8,752,712 tons.

In the 5-year period from 1941-1945, total exports amounted to 35,800,000 net tons, only slightly less than the total tonnage of steel used in this country to build ships during the same time.

In 1944, the last year for which figures are available, the United Kingdom took 24 pct of all our exports of iron and steel, Canada followed with 15.4 pct, with Russia a close third at 14.6 pct.

The kinds of iron and steel products exported from this country during the war almost exclusively reflect military expediency. Tonnagewise, the largest classification shipped in 1945 was that of ingots, blooms, billets, slabs and sheet bars. This classification, with shipments totaling 3,063,654 tons, accounted for 39 pct of the total 1945 exports. In 1936, by comparison, the same products amounted to less than 2 pct of the exports for that year.

The increase in the export of ingots, blooms, billets, slabs and sheet bars indicates the enormous and successful effort made by the Allied Nations to use their overall steel finishing capacity with maximum efficiency.

Shipments of these semifinished products to overseas finishing mills and plants helped relieve the burden of our own finishing facilities and, in the process saved badly needed shipping space.

Motor Car Makers Lost More Than $50 Million

Detroit

• • • **The automobile** industry sustained a net loss of $50,153,714, or more than ten pct on every dollar of sales during the first quarter of 1946 according to a survey just completed by the Automobile Manufacturers Assn. The loss includes allowances for tax credits under the excess profits tax carryback provisions, and is greater than the loss sustained during any similar period in the history of the automotive industry. During the year 1932 a deficit of 6.7 pct on each dollar of sales was reported.

Lack of materials and parts and other interruptions to operations are the primary cause of the operating loss according to Oscar P. Pearson, chief statistician of the Automobile Manufacturers Assn.

Steel Foundry Output Hit 1946 Peak in April

New York

• • • **Total shipments** of steel castings during April amounted to more than 146,000 short tons, according to a report by the Bureau of the Census. These shipments were 44 pct greater than the 101,000 tons shipped during March, and were higher than any month since June 1945. Of the 146,000 tons shipped during April, almost 119,000 tons, or 81 pct, were of carbon grade steel, and about 27,000 tons, or 19 pct, were of alloy (including stainless) grade.

Nearly 109,000 tons or 74 pct of all steel castings shipped during April, were for sale to the trade; the remaining 38,000 tons of steel castings were produced for the manufacturers' own use. Of the castings shipped for sale, about 34,000 tons, or about one-third, were railway specialties.

Unfilled orders for steel castings for sale at the end of April amounted to 393,000 tons, a slight decrease from the backlog of orders at the end of March. The decrease occurred in orders for railway specialties, which dropped from 131,000 tons at the end of March to 111,000 tons at the end of April. Of the April unfilled orders 328,000 tons, or 84 pct, were for carbon steel castings, and 65,000 tons, or 16 pct, were for castings of alloy grade.

Heat Cases No Problem

New York

• • • **Some steel circles** are fearful that steel production this summer may be affected 4 to 5 pct by the effect of hot weather. Such a reduction would run counter to the present trend in steel output. On the other hand it is pointed out that during the past several years the normal effect of hot weather on steel has been negligible.

Practically all the credit for this showing goes to the unsung heroes in the medical depts. of the various steel firms who have kept a constant watch on heat exhaustion cases during the summer months over the past many years. It is possible, according to expert opinion, that actual interference with steel output due to heat waves will be completely eliminated.

Gallup Polls

(CONTINUED FROM PAGE 107)

Gen. Harry H. Arnold; Gen. Joseph T. McNarney; Gen. Mark Clark; Gen. Omar Bradley; Gen. Bernard L. Montgomery of England; Gen. Claire L. Chennault; Gen. Joseph Stillwell.

Political Leaders: Rep. Clare Boothe Luce; John W. Bricker; Chester Bowles; Sumner Welles; Sen. James M. Mead; Sen. Harry F. Byrd; Herbert H. Lehman; Sen. Walter F. George; Sen. Robert La Follette; Paul V. McNutt; Gov. Frank Lausch of Ohio; Justice Frank Murphy; Justice Robert Jackson; James A. Farley; Sen. Millard Tydings; Eamon de Valera; Andrei Gromyko, Russian delegate to the UNO; Sen. Tom Connally; Anthony Eden; Queen Wilhelmina of Holland; Sen. Claude Pepper; Gov. Earl Warren of California; Sen. Burton K. Wheeler; Sen. Robert A. Taft; Sen. J. William Fulbright; Sen. Owen Brewster; Gov. Ellis Arnall of Georgia; Henry L. Stimson; Charles Hughes, Harold L. Ickes.

Commentators and Writers: Gabriel Heatter; Fulton Lewis, Jr.; Drew Pearson; Lowell Thomas; George Bernard Shaw; Robert St. John; H. V. Kaltenborn; Westbrook Pegler; Dorothy Thompson; Walter Lippmann.

Scientists: Albert Einstein; Charles F. Kettering.

Business Leaders: Eric Johnston; Henry Kaiser; Joseph P. Kennedy; William S. Knudsen.

Others: Queen Elizabeth of England; J. Edgar Hoover; Oveta Culp Hobby, former head of the WAC; Col. Robert R. McCormick, publisher of the *Chicago Tribune;* Madame Chiang Kai-shek; and Sister Kenny.

Electronics Conference Set for Chicago in Fall

Chicago

• • • **Plans are now** nearing completion for the Second National Electronics Conference, to be held Oct. 3, 4 and 5 at the Edgewater Beach Hotel in Chicago. Dr. E. U. Condon, director, National Bureau of Standards, will be the keynote speaker for the conference.

The technical program will comprise papers on communications, radar, television, industrial electronics, instrumentation and theoretical research. There will be approximately 50 papers presented. Emphasis will be placed on the frontier type of paper, representing the latest in scientific and engineering developments. The papers will be published in the conference proceedings and the authors will be given the privilege of publishing the papers in any other journal. The complete program will be available at an early date.

Exhibits of electronic equipment, including the latest commercial developments, will be a feature at this year's conference.

The conference is sponsored by the Illinois Institute of Technology, Northwestern University and the University of Illinois together with the Chicago sections of the A.I.E.E. and I.R.E. Dr. J. E. Hobson, Armour Research Foundation, is the chairman of the board of directors of the National Electronics Conference, and W. O. Swinyard, Hazeltine Electronics Corp., is the president.

Industry Spent 40 Pct For Payrolls in 1945

New York

• • • **The disposition of the** dollar received by the steel industry in 1945 from the sale of its products once again reveals the large share absorbed by payroll and material costs. Last year the combined cost of payrolls and materials accounted for 82½¢ of every dollar received, according to the American & Steel Institute.

In 1945, 40¢ of the dollar received from the sale of products went into payrolls, an increase of 3¢ over the amount paid out in 1937, a representative prewar year. Compared with 1937, exactly half as much of the 1945 steel dollar remained after costs to be paid out as dividends for investors. Two and one-half cents were paid out for this purpose in 1945, compared with 5¢ in 1937.

The amount per dollar paid out in taxes during 1945 shows a drop of 2¾¢ from the same cost in 1944. The 1945 figure of 4¼¢ is 1¼¢ below the tax cost for 1937. The drop in taxes from 1944 to 1945 is the result of a shrinkage for the

industry over the same period of almost one billion dollars in net billings.

The amount per sales dollar set aside in 1945 as a reserve for future contingencies was ¾¢. This figure represents an increase of ¼¢ from the amount set aside in 1944, but it is down 1¾¢ from the amount that was put aside for the same purpose in 1937.

Of the 1945 dollar, 6¢ was earmarked for depletion and depreciation. This compares with 4½¢ in 1944, and 5¢ in 1937. The 1945 cost of materials and supplies, 42½¢, was up ½¢ from 1944, and down 1½¢ from the same cost in 1937.

The amount of each dollar received by the industry that was paid out for selling and general administrative costs was up ½¢ in 1945 from the 1944 figure of 3¢.

Tungsten Firm Develops High Density Alloys

New York

• • • **The Callite Tungsten Corp.** has announced the development of a series of high density alloys known as "Dense Alloy 112," in three general types: (1) Type P—largely tungsten, copper, nickel and small percentages of other alloying ingredients; (2) type E—composition largely tungsten, cobalt, silver; and (3) type Y—composition largely tungsten, cobalt, nickel.

These new alloys are expected to find their major application where high strength and high density is of prime importance. For example, they are especially adaptable as balancing weights where space is a prime factor. Because of their ready machinability, precise balancing can be attained such as is required in rotors and governors for gyroscopes. Ordinary machining operations such as milling, shaping, turning, drilling, tapping, etc., present no difficulties. The high density of these alloys becomes quite apparent by comparison, for example, with lead. Lead has a density of 11.3 g per cc equivalent to 0.41 lb per cu in. These new dense alloys are 17.3 g per cc, or .620 lb per cu in.

Dense Alloy 112, produced by powder metallurgy, is available in round, square and special shapes. They can be brazed or soldered by standard commercial methods.

London Economist

(CONTINUED FROM PAGE 113)

rest of industry, the stimulus of favorable conditions for investment will be much more effective than the issuing of instructions. Moreover, the efficiency argument, never very impressive, is the harder to sustain the further the argument gets away from the admitted case of coal. It is by no means proved that public boards are less restriction-minded than private capitalists. And full employment, if it is maintained, is likely to be just as strong a solvent of restrictionism in the one case as in the other. The reports of the first two working parties have already brought out how high wages and scarcity of labor are likely to force the pace of capital re-equipment and the improvement of working conditions. In these circumstances, exactly what other than a living sacrifice to dead doctrine is to be gained by wholesale nationalization?

To this question the Labor Party has never begun to give a real answer. And when the time comes, it is likely to find that the really urgent question is not what to nationalize next, but what policies to pursue in the industries that, by then, will have been successfully nationalized. What is the distinctively Labor policy *within* a nationalized industry? There are several possible answers, of which one is at present outstandingly important. The labor movement, on both its political and its industrial wings, has always stressed the need to democratize both industry and public administration. It has claimed that citizens in general should be drawn more actively into the work of government — particularly local government—and, above all, that industrial workers should take a responsible part in the conduct of their own enterprises.

THERE is no need to emphasize the importance of this ideal, particularly as it affects industry. Falling productivity, strikes, and other industrial troubles are due at least in part to the weakness of the workers' sense of responsibility for the economic consequences of their own actions. This sense of responsibility would certainly be strengthened by an increase in labor's share in industrial policy-making; especially, at the moment, in the share of the lower ranks of labor.

But can it fairly be said that everything needed to strengthen it is in fact being done? Is the joint production machinery being put—or kept—in a condition to bear the burdens which should be falling on it? Is there enough local and unofficial participation in the control of the distribution of industry? Regional Development Councils, representing employers, workers and trade unionists, played a big part in the drive to help the depressed areas before the war. Are they, or similar bodies, being allotted an adequate part today? Has a clear definition been reached of the respective functions of managements and joint labor-management machinery—a definition which will leave managers free to manage, and at the same time satisfy the legitimate claims of labor? What steps are being taken to remedy the astonishing lack of information about costs, financial returns, and many other aspects of industrial policy commonly shrouded in secrecy—a secrecy which for many members of the labor movement bears the sinister suggestion of an anti-social conspiracy?

This is, in fact, a field where more attention from the labor movement is urgently needed. It is not one where quick or spectacular results can be expected. A sustained educational campaign will be needed over several years. But the task is one of vital national importance, particularly in conditions of full employment where traditional methods of industrial discipline have partly broken down. It is also one which only the labor movement can adequately discharge.

The other main complex of economic problems which deserves more of the labor movement's attention—and, it is only fair to add, seems likely to get it—is the future framework of private enterprise. The working parties represent no more than a start in this direction. It remains for the government in due course to weld the reports on individual industries into a comprehensive national policy. A labor

government may, perhaps, seem a curious source for a plan to build up private business. But if labor is to be the governing party it must have a positive and responsible policy for that very large section of the nation's economic activity which, even in the most fervent socialist dreams, will remain in private hands for a long time to come. It is not a policy simply to increase the risks and diminish the rewards of enterprise. It is not a policy to multiply the controls unless the stimuli to activity are also strengthened. And from the narrow standpoint of party politics, what could be a better form of stealing the Tories' clothes while they are bathing than for the Labor Party to produce an effective, imaginative and responsible policy for private industry?

Responsibility, indeed, is the key to Labor's future needs. Labor, whether in the wilderness, in minority office or as junior partner in a coalition, has always hitherto been the party of opposition. Even this first term of office will be dominated by the projects of legislation long matured in opposition. Labor's task hereafter is not to redress grievances but to formulate policies, not to legislate theories but to administer realities. For two generations it has exempted its followers from any responsibility for the consequences of their actions by teaching them that all blame can be thrust upon, and all wealth requisitioned from, an exploiting class. That teaching must now be reversed. The ordinary trade unionist will have to learn that he is now a member of the "boss class" and that he must shoulder the responsibilities.

50,000-psi Compressor

Washington

• • • **Reciprocating** compressors for delivering hydrogen at 3500 atmospheres were developed by the Germans, according to L. P. Jehle, investigator for the Joint Intelligence Objectives Agency. Operated on a suction pressure of 300 atmospheres (approximately 4410 psi) building up to approximately 51,450 psi, had a capacity of 3.5 cu ft per hr. The detailed report, surveying nine German compressor manufacturers, is available as PB-12610 from the Office of the Publication Board, Dept. of Commerce.

British Will Examine Future of Tin Mining Industry in Cornwall

London

• • • **The Cornish tin** mining industry's future is to be examined by a departmental committee shortly to be appointed by the British Minister of Fuel and Power. The whole production of Cornish tin is at present bought by the British Ministry of Supply on a "cost-in-contract" basis, the price paid for each consignment being related to its production cost plus a percentage for profit. The price paid by the ministry is not published, but it is believed to exceed $1200 per ton.

Mine production of Cornish tin decreased continuously for many years before the war and by 1939 it was down to about 2000 tons per annum. During and since the war it has continued to fall and is now at the rate of about 1200 tons per annum. Alluvial production is responsible for about another 300 tons annually.

South Crofty and Geevor are the only two mines now in operation, East Pool and Agar having ceased production in 1945 after operating for over 100 years. Production costs in the industry have risen sharply during the war and a serious shortage of skilled labor has now developed. Considerable sums of public money which are believed to amount to more than $2 million have been spent during the war on prospecting in Cornwall and investigating plans for reopening old shafts or sinking new ones and for increasing alluvial production but the results have been disappointing.

Threatens Lakes Tieup

Cleveland

• • • **Demands for a** 40-hr week on Lake ships, following ratification of the strike-preventing deep sea contract last week, will be brought into sharp focus at a conference of ship operators June 20, which has been called by Frank Jones, Lakes contract director for the CIO National Maritime Union. Mr. Jones has threatened to file strike notices against nine lines if demands for a 40-hr work week and pay raises are not met. He has also asked NMU to lend its full support to the Lakes drive.

Packard Motor Grants Retroactive Wage Rise

Detroit

• • • **Packard Motor Car** Co. has granted wage increases approximating $3,500,000 annually according to a recent announcement by George T. Christopher, president. The increased rate is retroactive to Mar. 4.

Employees not represented by the union have been notified of a 15 pct increase in pay. Other workers were covered in terms of a new contract which has been ratified by the membership of UAW-CIO Local 190.

Under the wage agreement, the company grants hourly-rated employees an 18½¢ an hr wage raise and salaried workers represented by the union a 15 pct increase. The company agreed to checkoff dues and assessments of union members and increased to three hr the call-in pay for workers who are sent home because of unforeseen production stoppages.

Atlantic City Site Of Metal Congress

Cleveland

• • • **The 28th annual** National Metal Congress and Exposition will be held in Atlantic City's Municipal Auditorium, Nov. 18 to 22 inclusive, according to an announcement made recently by W. H. Eisenman, managing director of the event.

Meeting jointly during the NMCE will be the American Society for Metals, The Iron and Steel Div. and the Institute of Metals Div. of the American Institute of Mining & Metallurgical Engineers, The American Welding Society and the American Industrial Radium and X-ray Society.

The holding of the National Metal Congress and Exposition in Atlantic City marks the first time in 5 yr that the event has been held in the East. It is anticipated that approximately 70 pct of the 1946 NMCE attendance will be from the Eastern section of the country.

On the basis of previous attendance figures for NMCE meetings in Atlantic City, it is estimated that more than 25,000 executives, engineers and production men will visit the exposition.

Swiss Steel Firms Starve for Coal; Send Men to Belgium

Paris

• • • **Switzerland has** sent miners to Belgium to assist in coal production in that country, and indirectly to facilitate coal exports to Switzerland, but the arrangement is not considered to be working out satisfactorily. Switzerland is entirely dependent upon imported coal for the operation of its two steel companies.

The Swiss do have certain iron ore mines in Fricktal and Gonzen, but in prewar years this ore was principally exported due to the lack of coal. Total ore reserves in the country are estimated at 50 million metric tons. The Gonzen reserves, worked only since 1937, are estimated to total two to three million metric tons. The ore is hematite of about 50 to 60 pct Fe. Before the war this ore was going to the Saar in return for pig iron at the rate of about 60,000 tons per year.

At the end of 1940 a company known as Jura Bergwerks A.G. was created to develop the production of the Fricktal mines. It has delivered about 80,000 metric tons of iron ore since 1939.

The Ludwig von Roll Steelworks produces about 50,000 tons of steel from an openhearth shop and an electric shop. It depends upon foreign supply for pig iron, scrap, and some semi-finished products. The other unit is the Moos Steelworks at Lucern, which have a capacity of about 40,000 metric tons of finished steel from imported semis.

Available statistics for prewar Swiss steel imports lump scrap imports together with semi-finished and finished steel: (Figures are in metric tons)

1929	564,000	1934	486,000
1930	576,000	1935	372,000
1931	542,000	1936	403,000
1932	470,000	1937	535,000
1933	505,000	1938	355,000
	1939	548,000	

The average of imports for the ten prewar years is 485,000 metric tons, the bulk of which came from the Continental producers. The United States entered this market only a few years before the war with quantities of light rolled products and tinplate. The following table lists the principal sources of supply in 1939 in metric tons:

During the war years imports dropped off, and drastic measures were undertaken to conserve scrap and facilitate domestic steel production. The war industry and labor office of the Swiss government put into effect a scrap tax which was levied on all firms using steel. The Swiss Army contributed about twenty thousand tons per year, the steelworks 12,500 metric tons, agriculture 10,000, the railroads 10,000, and the scrap merchants 62,000. Including this and miscellaneous supplies the steel industry obtained about 150,000 metric tons per year.

During the war steel imports are reported by official Swiss sources to have totaled 1,747,000 metric tons, and scrap collections in Switzerland 868,000 tons.

The last four months of 1945 saw 148,000 metric tons of steel products imported into Switzerland in comparison with 140,000 for the whole of 1944. The main sources for 1945 were: Belgium-Luxemburg 80,000, Czechoslovakia 22,000, U. S. 11,000, and Sweden 15,000 metric tons.

Renault at 60 Pct Level

Paris

• • • **Renault Works** which has been nationalized is producing 80 trucks and 40 passenger cars daily, 60 pct of its prewar production. The Le Mans Works produces four farm tractors per day. Belgium receives 40 pct of the company's exports which are also sent to Sweden, Switzerland, Netherlands, Australia, etc.

Swiss Imports in 1939

	France	*Belgium and Luxemburg*	*Germany*	*Czechoslovakia*
Pig iron	101,990	**2,870**	**22,260**	1,810
Bars	28,210	26,890	21,510	5,600
Sections	17,940	28,030	12,110	410
Sheets	22,420	12,120	15,750	7,170
Wire rod	15,590	2,870	1,790	1,080

Germans Aircraft Shop Used 30,000-Ton Forge Press for Magnesium

Washington

• • • **A 30,000-ton** forging press for magnesium forgings, probably the largest and most powerful in the world, was built at the I. G. Farbenindustrie plant at Bitterfeld, Germany, in 1944, according to R. T. Wood, investigator for the Technical Industrial Intelligence Branch, Dept. of Commerce.

Mr. Wood's report on German developments in fabricating magnesium alloys since 1939 is now on sale by the Office of the Publication Board, Dept. of Commerce. Although German peak production of 110 million lb of magnesium in 1943 fell far short of U. S. peak production of 366 million lb, several novel processes of interest to the American magnesium industry were developed.

The monstrous forging press was equipped with eight supporting columns and stood 85 ft above the floor line. Eight cylinders distributed the hydraulic pressure evenly. The dies were mounted on a table 32.8 by 19.7 ft. At the time production ceased at Bitterfeld the press was forging aluminum wing spar caps, 6 and 10 m long, for aircraft.

According to the report, magnesium forgings were used largely for in-line aircraft engine supports. Other remarkable forgings were a large aircraft landing wheel and a side frame for a 155-mm gun.

Another novel development in the German industry was the use of anhydrous ferric chloride to refine the grain of magnesium alloys containing aluminum. Known as the "Elfinal" treatment, the operation was performed at temperatures of 760-780° C.

In addition to extrusion forging and rolling processes known or used in the United States, the Germans developed a water dip process for making ingots. The process employed a hot thin-wall mold. After removal from the mold, each ingot was sliced for fracture examination and scalped all over. I. G. Farben metallurgists claimed the following advantages for the water dip method: Better uniformity of composition, less waste, consistent quality, less dependence on skilled

labor, and no limit on the size of the ingot that could be cast. The principal disadvantage was higher cost.

Descriptions of these methods and processes are included in the report (PB-9100; photostat, $2; microfilm, 50¢; 17 pages).

A report on American wartime research in magnesium press and hammer forgings (PB-16397; photostat, $6; microfilm, $1; 89 pages), also available from OPB, states that one reason for lack of progress in developing magnesium forgings in this country early in the war was lack of a sufficiently large (15,000-25,000-ton) press. The report describes research done by the War Metallurgy Committee of the National Academy of Sciences in the first half of 1944. The report concludes that complicated forgings could be made from any of the standard magnesium forging alloys, provided proper manufacturing procedures were employed.

Orders for these reports should be addressed to the Office of the Publication Board, Dept. of Commerce, Washington 25, D. C., and should be accompanied by check or money order, payable to the Treasurer of the United States.

Enamel Institute Meets

Pittsburgh

• • • **Principles of** OPA price regulation, relationship of OPA to the construction industry, and the critical enameling sheet supply situation were the subjects of discussion at a recent industry conference of the Porcelain Enamel Institute in Washington.

Douglas Whitlock, chairman of the advisory board of the producers' council, discussed the OPA and construction, W. L. Pringle, head of the machinery, materials, and refractory section of OPA, described the basic principles of price regulation applied to industry, and Burton Longwell, Republic Steel Corp., presented the steel producers' problem of decreased supply and increased demand.

Two vacancies on the board of trustees were filled by the election of M. J. Salton, Seaporcel Porcelain Metals, Inc., and H. F. MacIntyre, Ferro Enameling Co. The date of the Institute's annual meeting was set for Oct. 23, 24, and 25 at French Lick, Ind.

TRIMMING

In designing die castings, it is important to remember that flash always occurs on castings at the die partings, and that steps can be taken in design to bring the flash where it can be trimmed most easily and quickly by a shaving die.

Cost of flash removal is minimized when:

1. *The die parting can be in a single plane.*
2. *Slides and movable cores are not required in the die.*
3. *Cores do not join or intersect in forming the casting.*
4. *Blind holes rather than through holes are employed.*
5. *Contours of the casting at the parting are of simple shape.*
6. *Flash occurs at points where other machining is required, in which case a separate flash removal operation is avoided.*

Flash which runs along a flat surface, and is not at the extreme edge of the casting, is difficult to remove cleanly without leaving tool marks on adjacent surfaces.

The designers of the above *zinc alloy* die cast coffee mill housing avoided this problem by merely employing decorative beads on either side of the casting at the parting line. Thus the flash occurs on the beads, from which it is easily shaved off without marking the surrounding areas.

Additional data on trimming and other design considerations appear in our booklet "Designing For Die Casting." To insure that you will get the most from your die casting dollar, ask us—or your die casting source—for a free copy of this booklet.

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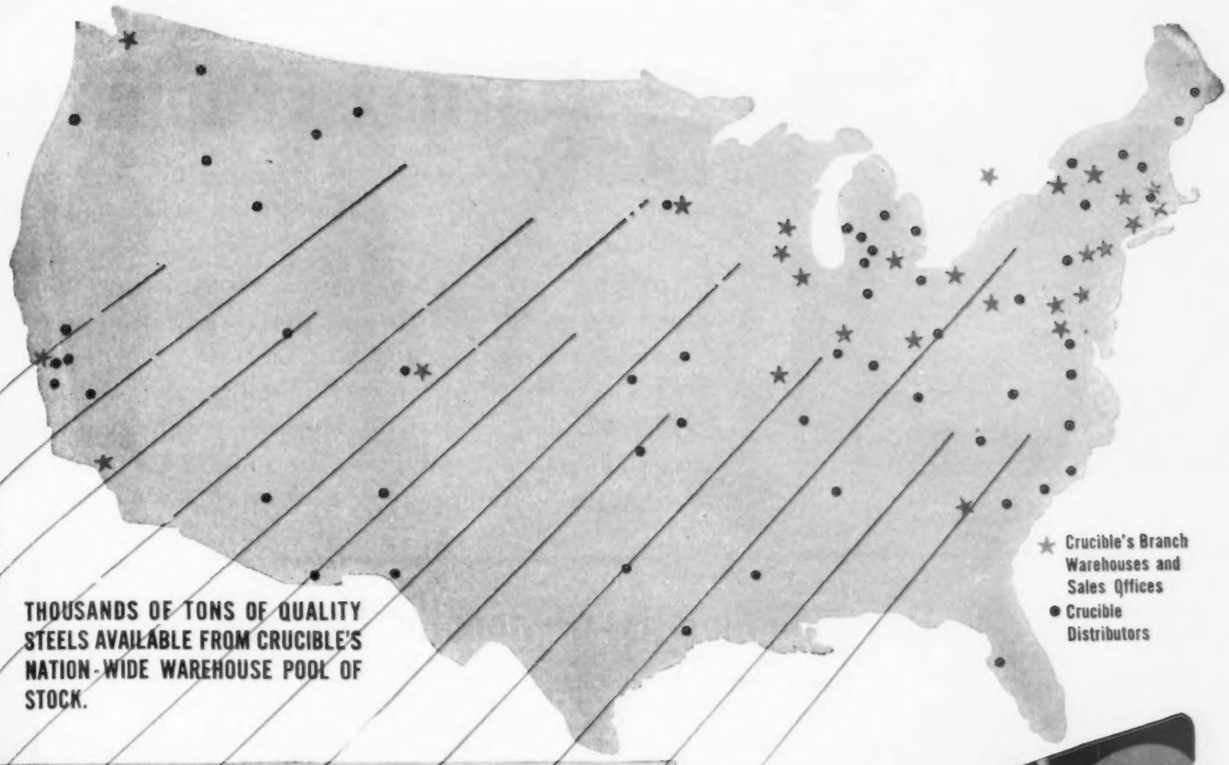

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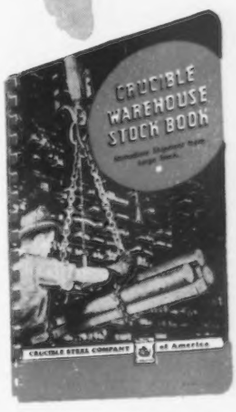

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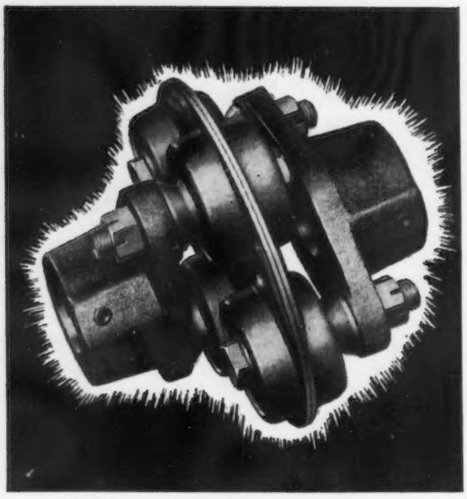

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Fig. 1—Section of trunnion block in free state before insertion into housing. Note that due to the special shape of the block, the internal stress is constant throughout its volume under all conditions.
(A) Compressed on diameter when inserted into housing.

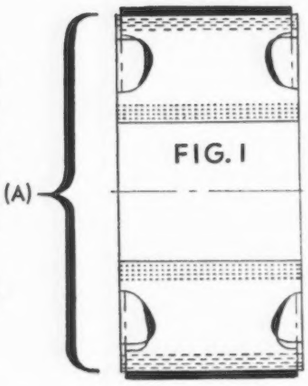
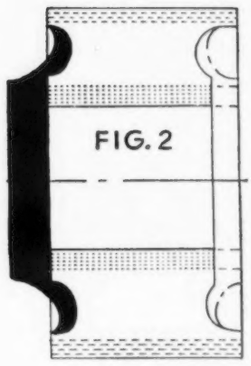


Fig. 2—Axial displacement resulting from thrust loads.



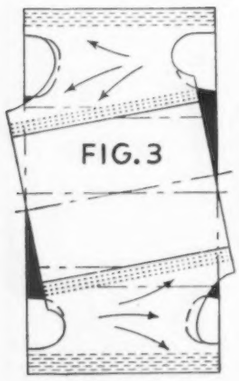


Fig. 3—Angular deflection. Displacement of Neoprene, as indicated by arrows, resulting from angular misalignment of connected shaft.

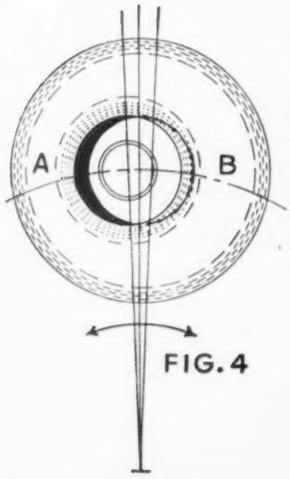


Fig. 4—Torsional deflection resulting from torque loads and torsional vibration. When the block is inserted into housing, the Neoprene is initially loaded. The torque load increases pressure at side A, and reduces pressure at side B, but under the maximum torque, the Neoprene at side B is still loaded.

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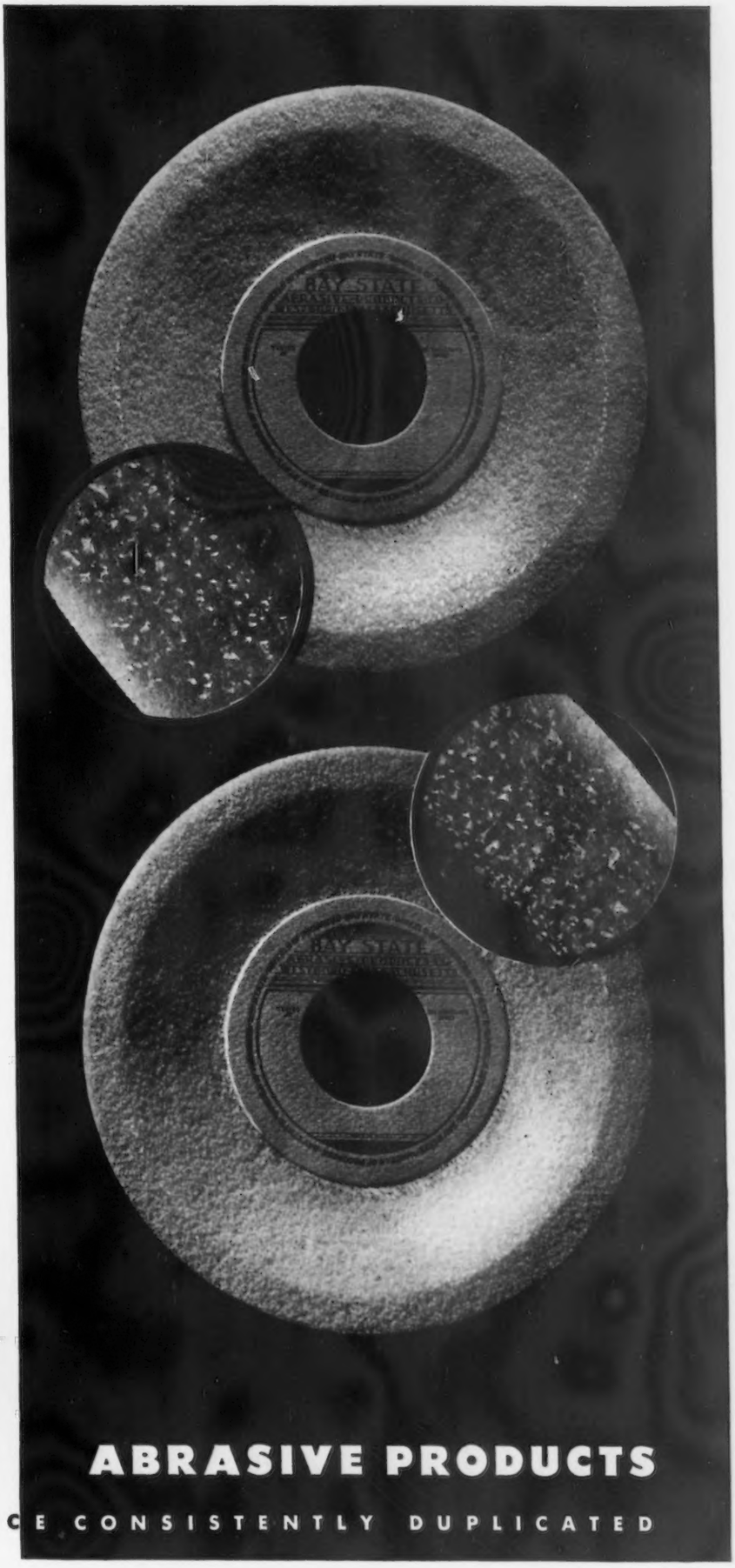

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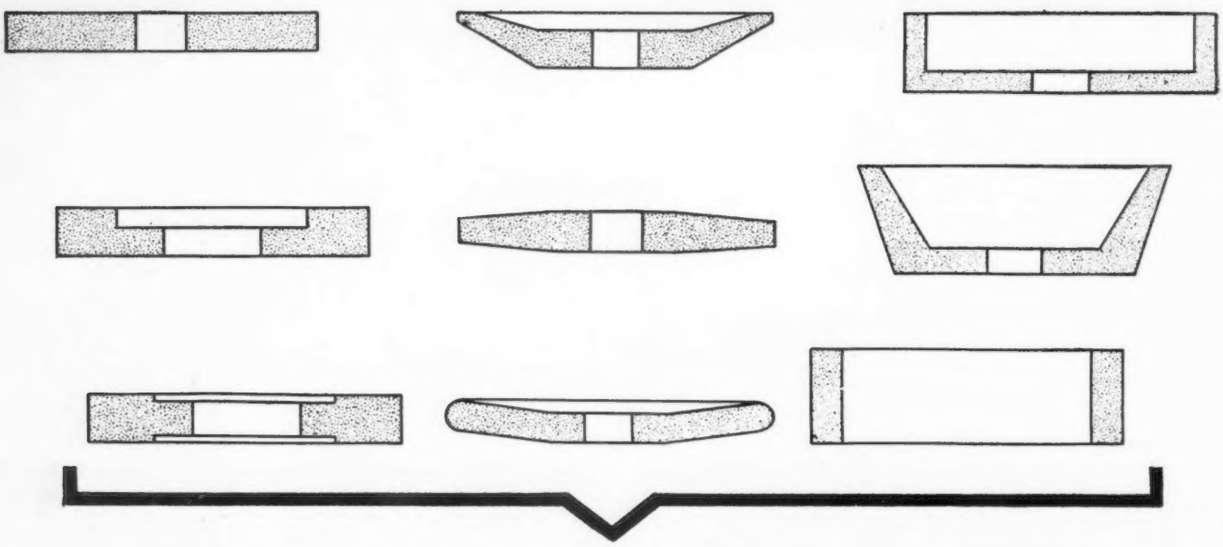

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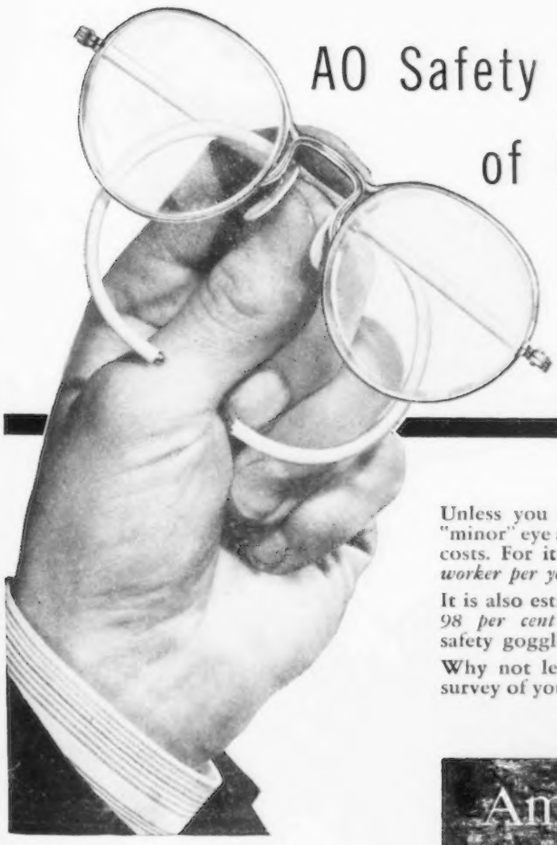
Sheets, Rolls, Discs

ABRASIVE GRAINS AND COMPOUNDS

for:
Polishing
Lapping
Pressure Blasting
Finishing

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company

You Might Be Surprised If You Check on What Eye Accidents are **Costing You**



AO Safety Goggles Safeguard the Eyes of Industry . . . **Reduce** Production **Costs**

Unless you have an adequate eye-protection program, even so-called "minor" eye accidents are probably adding substantially to your production costs. For it is reliably estimated that eye accidents run to *$5 per shop worker per year.*

It is also estimated (by the Society for the Prevention of Blindness) that *98 per cent* of these accidents are avoidable—through the use of safety goggles.

Why not let an AO Safety Representative make a complete eye-hazard survey of your plant? There's no obligation.

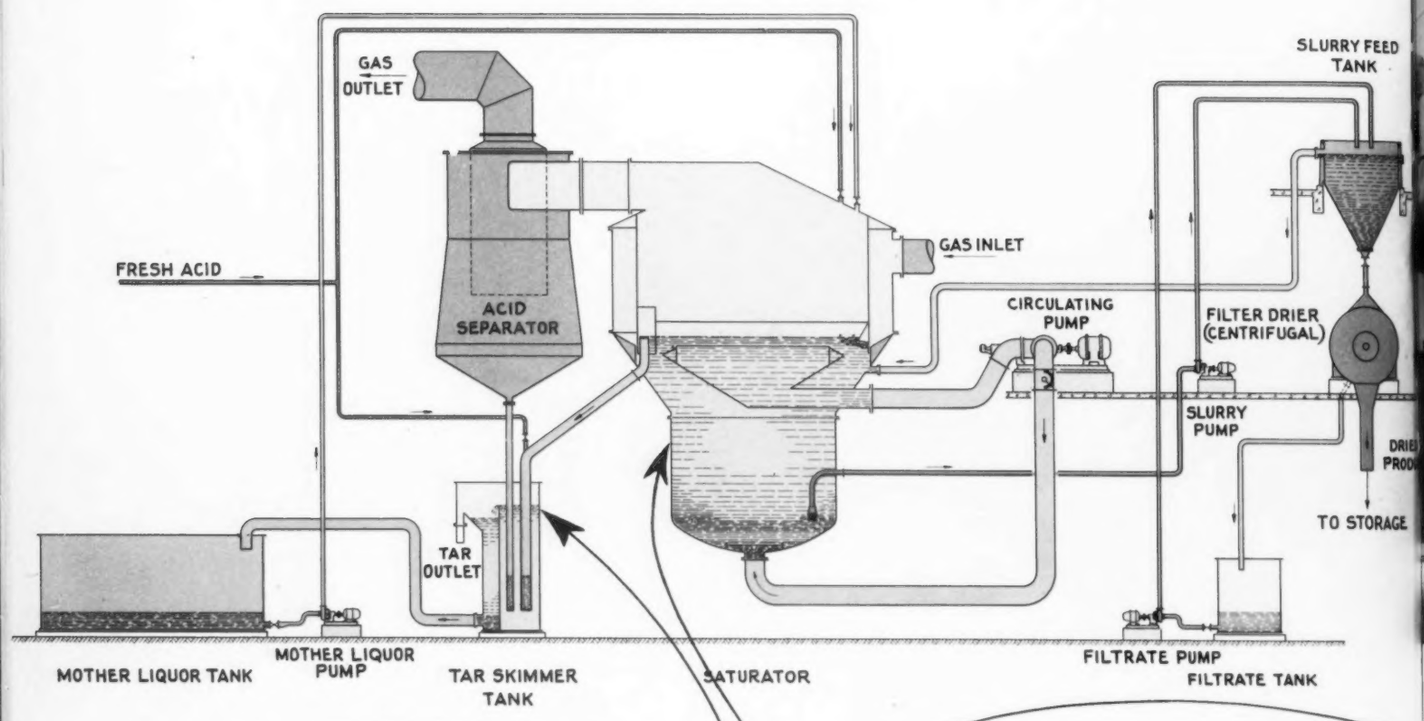
American Optical COMPANY *Safety Division*

SOUTHBRIDGE, MASSACHUSETTS
BRANCHES IN PRINCIPAL INDUSTRIAL CITIES

KOPPERS

presents the Low Differential C

LOWEST STEAM CONSUMPTION
LOWEST LABOR REQUIREMENT
LOWEST MAINTENANCE COST



The Liquor Level is Maintained Automatically and the Liquor is Purified Continuously

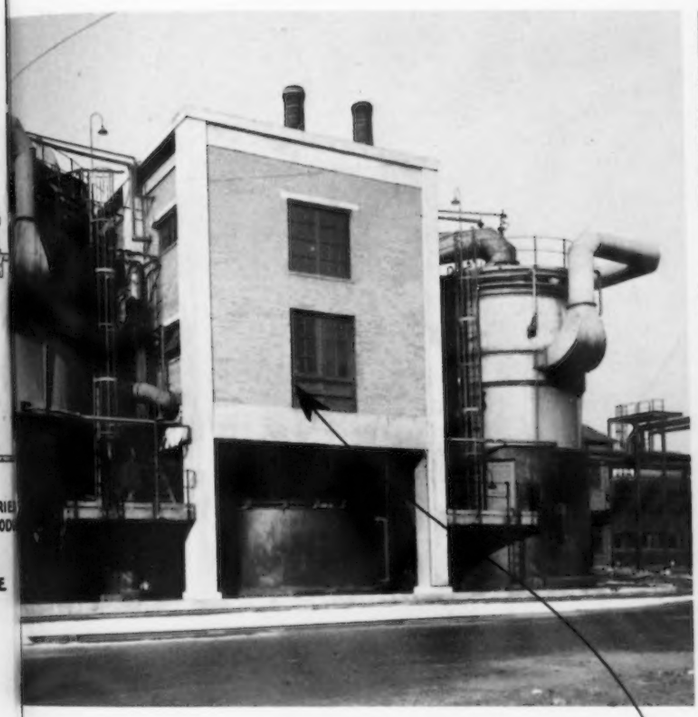
Crystal Size is Controlled and a Uniformly Sized Salt is Produced

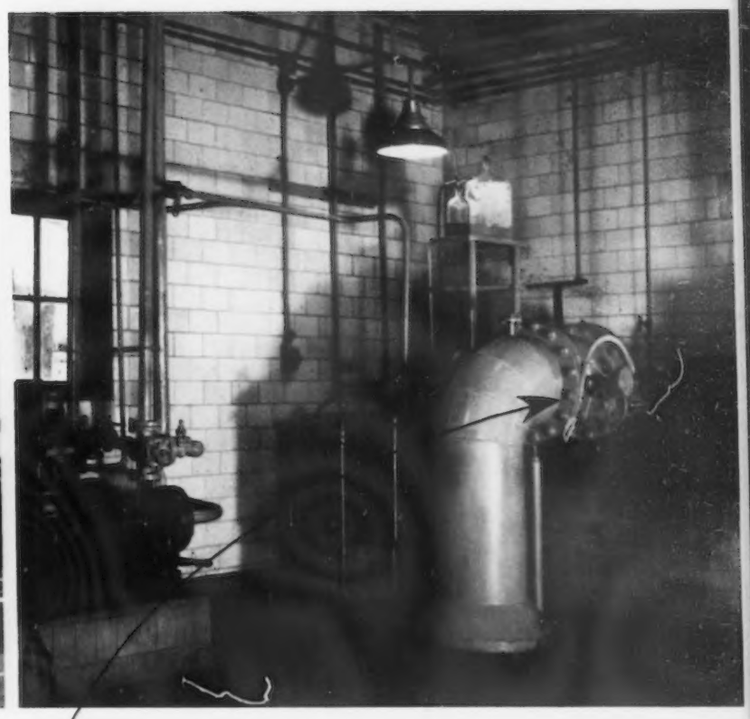
Single Units handling 50,000,000 Cubic Feet o
and others to handle up to 100,000,000 C

Classification Saturator

(STAINLESS STEEL)

FOR PRODUCTION OF BY-PRODUCT AMMONIUM SULPHATE





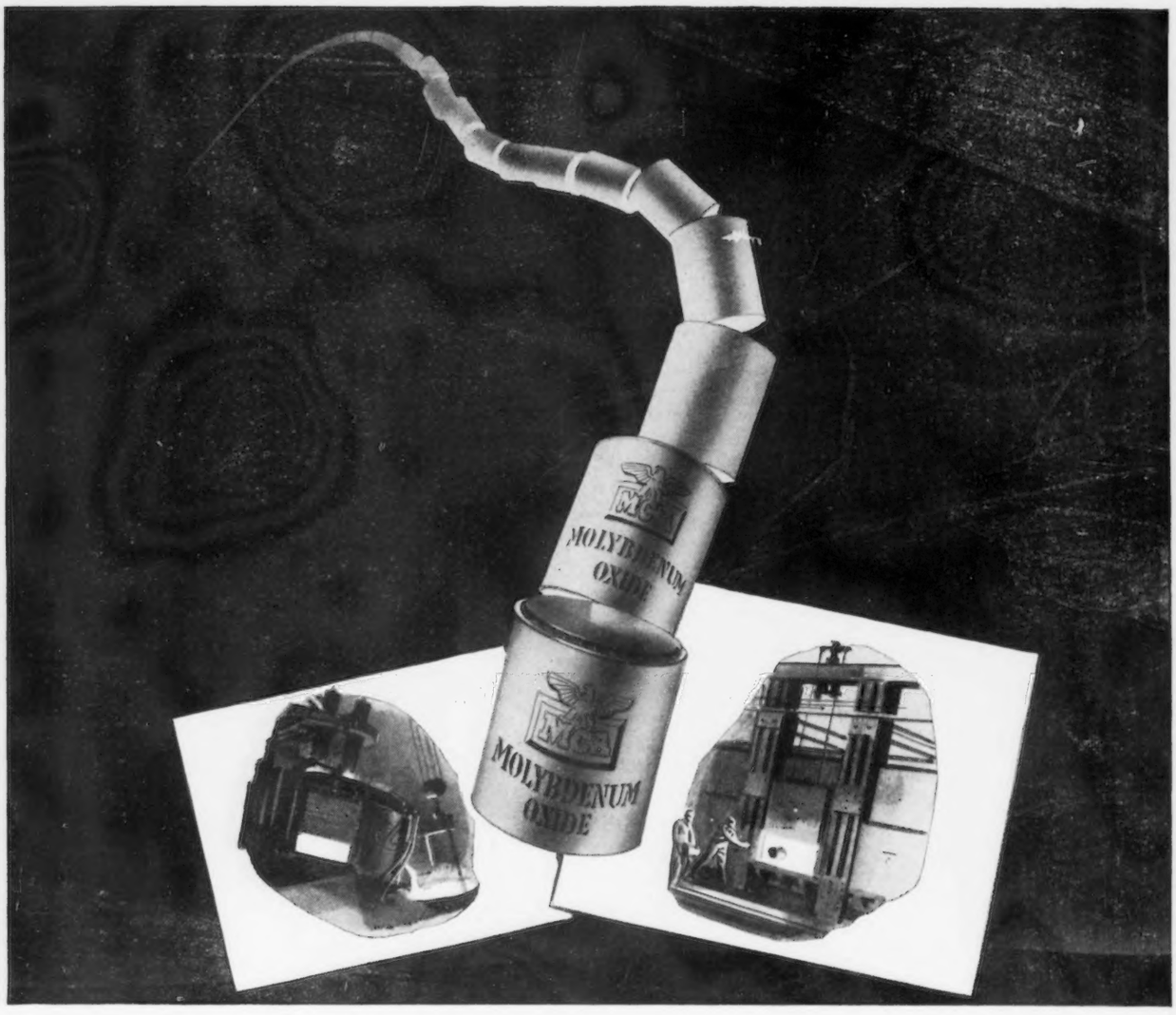
Operations are Simplified by Planned Location of Pumps, Dryers Meters, Gauges and Titration Table for Convenience of the Operator

the Ammonia is Removed from the Gas and the Growing Crystals are Classified within a Single Unit Using Liquor Circulation

Feet of Coke-Oven Gas per day are in operation

Cubic Feet per day are under construction

KOPPERS COMPANY, INC. · ENGINEERING & CONSTRUCTION DIVISION · PITTSBURGH 19, PA.



Economize with Molybdenum Oxide

More economical and therefore larger use of Molybdenum in irons and steels comes about through research and the spread of practical knowledge.

The economy of using Molybdenum Oxide in basic open-hearth or basic electric-steel manufacture has long been recognized. The low heat of formation of this product makes it ideal for rapid reduction in the steel furnace without the aid of reducing agents under either oxidizing or reducing conditions. High molybdenum content reduces bulk and tends to maximum efficiency. Convenient metal containers simplify handling and protect the contents during storage. The entire package goes into the melt, resulting in full benefits from the molybdenum, with no harmful effects from the container.

The Molybdenum Corporation of America, as a supplier of Molybdenum, and other alloying materials, has been unsparing in its effort to keep abreast of all such developments. Consultation is invited.

MASTER CRAFT ALLOYS

AMERICAN Production, American Distribution, American Control
Completely Integrated.

Offices: Pittsburgh, New York, Chicago, Cleveland, Detroit, Los Angeles, San Francisco, Seattle.

Sales Representatives: Edgar L. Fink, Detroit; H. C. Donaldson & Co., Los Angeles, San Francisco, Seattle.

Subsidiary: Cleveland-Tungsten, Inc., Cleveland, Ohio.

Works: Washington, Pa.; York, Pa.

Mines: Questa, N.M.; Yucca, Ariz.; Urad, Colo.

MOLYBDENUM CORPORATION OF AMERICA
GRANT BUILDING PITTSBURGH, PA.

MCA

Plants are obtaining more production per man-hour with Niagara Power Squaring Shears because of accurate cutting, quick setting, ball bearing, self-measuring parallel back gages, full visibility of cutting line, instant acting Niagara sleeve clutch and other modern features.

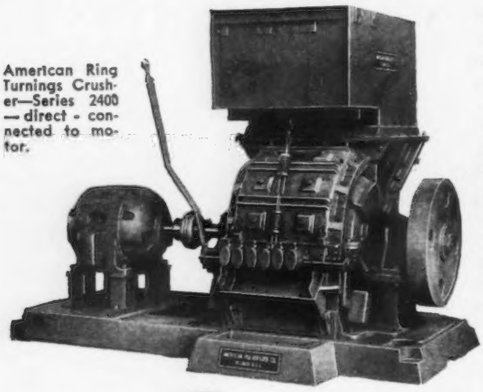
Enclosed drive with gears, clutch and eccentrics running in oil assure long life and low maintenance cost. Four-edge, solid tool steel knives are standard equipment. Niagara Machine & Tool Works, Buffalo, N. Y. District Offices: Detroit, Cleveland, New York.

Shear knives available for cutting alloy and special steels. Let us know what you desire to cut. Prompt delivery on spare knives for Niagara Squaring Shears. Also factory regrinding service by the same skilled men who grind new Niagara knives.

BUY UNITED STATES SAVINGS BONDS AND STAMPS

TURNINGS REDUCED BY AMERICAN CRUSHERS INCREASE CUTTING OIL RECLAMATION

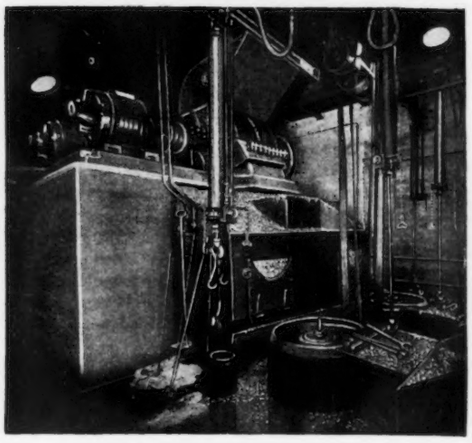
Turnings crushed to proper chip sizes release more cutting oil—and are handled faster



American Ring Turnings Crusher—Series 2400—direct-connected to motor.

Crushed turnings make it possible to put a bigger, better balanced load in your centrifuge basket in less time—and chips release oil particles more freely. The result is increased number of hourly loads, at greater capacity, with greater oil reclamation. American Crushers pay for themselves also in space saved and faster handling by reducing long curly turnings to chips.

Write today for complete information on American Ring Turnings Crushers



Oil Reclaiming Plant Units

American PULVERIZER COMPANY

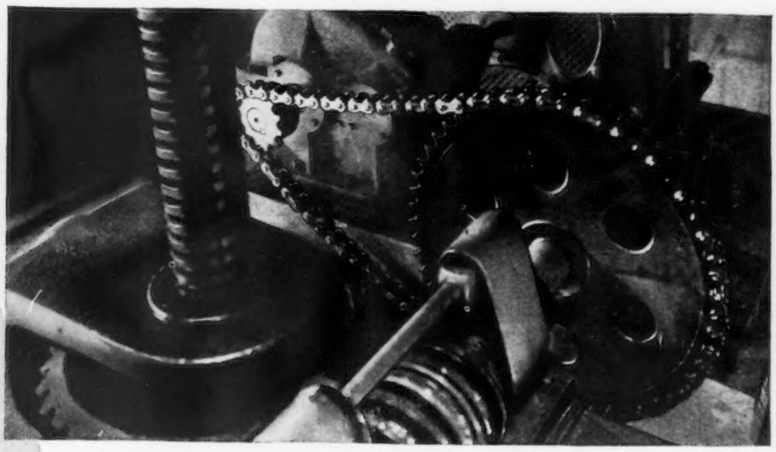
Originators and Manufacturers of Ring Crushers and Pulverizers

1439 MACKLIND AVE.
ST. LOUIS 10, MO.

NEED Sprockets NOW?

•

you can get them from EARLE GEAR



War-expanded facilities enable Earle to make fast deliveries on accurately cut-to-order sprockets. For over 43 years we have been meeting the needs of hundreds of concerns for sprockets in all sizes, of any pitch, made from any practical material and in *any quantity*. Our large stock of special cutters places us in an enviable position to quickly meet out-of-the-ordinary requirements as well. The next time you need sprockets avail yourself of these special Earle advantages. Phone or wire us details of your sprocket needs, for prompt quotation and delivery date. The Earle Gear and Machine Co., General Office: 4715 Stenton Ave., Philadelphia 44, Pa. Sales Offices: 149 Broadway, N. Y. 6; 901 Davis Ave., Pittsburgh 12, Pa.

SPUR • BEVEL • WORM • CONTINUOUS TOOTH AND REGULAR HERRINGBONE • SPROCKETS • RACKS, ETC.

EARLE GEARS

Here's How UNITED CHROMIUM Helps You Do

MORE EFFICIENT, MORE ECONOMICAL

Chromium Plating

IF YOU ARE PLANNING to plate with chromium for the first time, United Chromium engineers can help you get a high quality finish *right from the start*. They help you lay out your plant, help you plan your plating procedures and sequences and recommend the most efficient equipment for your purposes.

Even if you *have* been plating for some time, you have a lot to gain under a United Chromium licensing arrangement. United Chromium engineers keep you up to date on the newest and most efficient plating procedures . . . show you how to effect new economies with money-and-materials-saving developments.

In either case, the Unichrome organization offers you the benefit of more than twenty years of experience in solving the most difficult plating problems. Over 1,000 plating plants have already availed themselves of this valuable technical assistance. Write for complete information on the United Chromium licensing arrangement, and prepare the way for more efficient and more economical chromium plating.

Research Facilities develop better and more economical plating methods, and give you results of over 20 years of experience. Unichrome laboratories help you maintain high plating standards by periodically testing solutions.

Surveys are made of your plating production facilities and methods. You receive advice on space and equipment required, drawings of plating room layout and plating fixtures, and detailed instruction sheets covering operations.

Field Engineers will check installation of equipment, supervise make-up of solutions, instruct your operators, and start you into production promptly. They cut costly experimentation, and help you speed up output.

Other Outstanding Processes —Unichrome Dips, for quick, chemically produced corrosion resistance for zinc; Anozinc, for anodic treatment of zinc; Unichrome Copper, for a smoother deposit that minimizes buffing.

UNICHROME

PROCESSES AND MATERIALS

FOR SURFACES THAT SURVIVE

Chromium Plating • Porous Chromium • Unichrome* Copper
Unichrome Lacquers • Ucilon* Protective Coatings
Unichrome Stop-Off Lacquers and Compounds • Unichrome Dips
Unichrome Rack Coatings • Anozinc* Compounds • Unichrome Strip

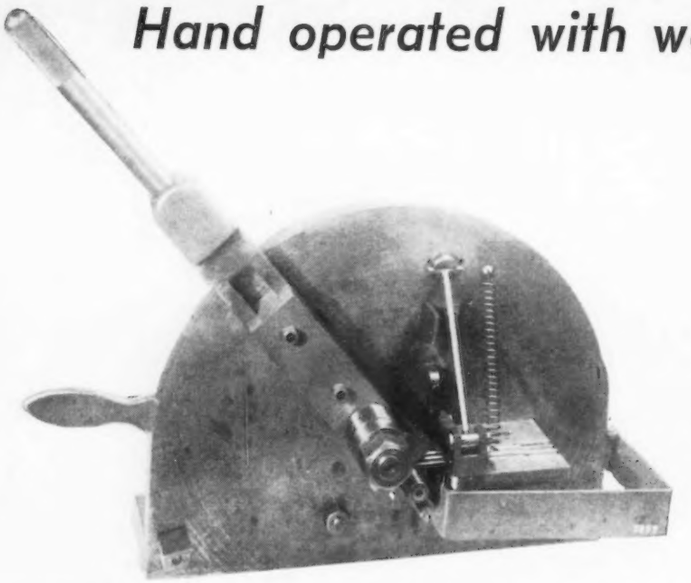
*Trade Mark Reg. U. S. Pat. Off.

UNITED CHROMIUM, INCORPORATED

51 East 42nd St., New York 17, N. Y. • Detroit 7, Mich. • Waterbury 90, Conn. • Chicago 4, Ill. • Dayton 2, Ohio • Los Angeles 11, Cal.

PEDRICK PRODUCTION BENDER

Hand operated with work ejector



When you pay a skilled workman for his brains and not his horse power; and when you buy a machine that does everything but think, you have a combination that gives maximum production at minimum cost. Such a machine is the hand operated production bender shown. This machine bends in multiple, is jigged and ejects the finished bend automatically. All the operator need do is load it and operate the bending lever.

Write for illustrated folder.

PEDRICK TOOL & MACHINE CO.

3640 N. Lawrence St., Philadelphia 40, Pa.

PARTS LIKE THESE, made to your specifications. Complete tooling facilities, modern heat-treating department. Spot welding and tapped assembly operations. Send in your prints or specifications.

Hubbard also makes standard and special cotters and washers. Send for special data sheets.

M. D. HUBBARD SPRING CO.

325 CENTRAL AVENUE • PONTIAC 12, MICHIGAN

Announcing . . .

The **OPENING** of a **PUBLIC WAREHOUSE** for the **STORAGE** of **STEEL** and **MACHINERY.**

This Building is of **FIREPROOF** Structure, **HEATED** and has a 4-CAR SIDING with 2 **OVERHEAD CRANES . .**

We Are Equipped to CRATE for EXPORT
We Have Connections With ALL PIERS and RAILROADS

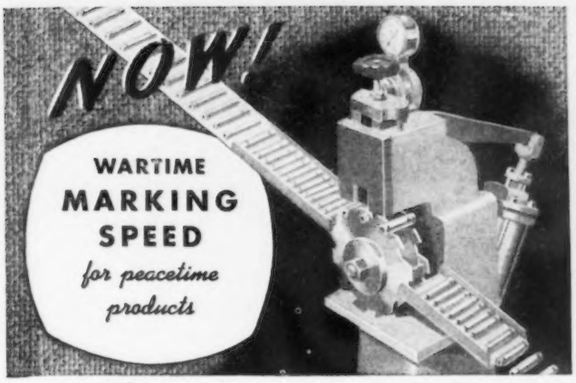
Perfect for Steel Distributors, Jobbers, Surplus Steel and Machinery Buyers

Write for Information and Rates
Give Complete Details

BROOKLYN STEEL WAREHOUSE CO.

1819 FLUSHING AVE., BROOKLYN, N. Y.

P. S. Sorry no phone! We are on the waiting list!



Out of the urgent demand for precision marking at highest possible production speeds have come new Noblewest marking machines for marking your peacetime products faster — better — cheaper. Model 156, illustrated, marks tubular parts. Adaptable to magazine loading. Has automatic positioning, and unloading. Noblewest Pneumatic Pressure Compensator assures uniform impression. For the answer to your marking problem write Noble & Westbrook Manufacturing Co., East Hartford 8, Conn.

MARK IT BEST WITH

NOBLEWEST

NOBLEWEST IMPROVED MARKING DEVICES

Hi-Speed Marking Machines

SEAMLESS HIGH PRESSURE GAS CYLINDERS

FOR ALL COMPRESSED and LIQUEFIED GASES

DIAMETERS UP TO 13"

•

HOT DRAWN FROM CARBON MANGANESE and CHROME MOLY STEELS

Carefully Made
Rigidly Inspected

•

Other TISCO Products:

MANGANESE STEEL CASTINGS • ALLOY & CARBON STEEL CASTINGS • FROGS • SWITCHES SPECIAL TRACKWORK MISC. SEAMLESS TUBING

SINCE TW 1742

TAYLOR-WHARTON IRON AND STEEL COMPANY

HIGH BRIDGE, N. J. & EASTON, PA.

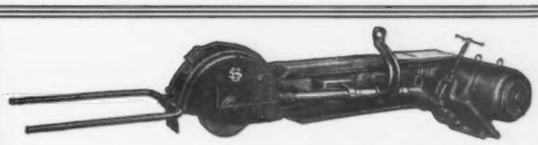
Cylinder Sales Office: 110 East 42nd St. New York 17, N. Y.

PRACTICAL TOOLS OF CONTROLLED QUALITY

FOR PRODUCTION OR MAINTENANCE

UNITED STATES ELECTRICAL TOOLS

are no drawing board dreams or laboratory brain storms . . . They're *practical tools,* precision designed and engineered . . . Built by capable men trained to uphold the US tradition which has pioneered and improved steadily since 1897 . . . Used wherever good mechanics choose *quality tools to make work and products better.*

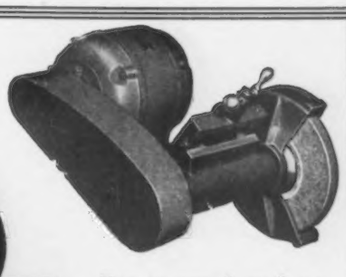


SWING FRAME GRINDER

Perfect visibility; perfect balance laterally and rotatively; angular adjustment 45° to right and 80° to left; easy wheel change; ball bearing. Chips and dirt removed in grinding slide off.

PRECISION LATHE GRINDERS

Model XX



THE United States ELECTRICAL TOOL CO.

CINCINNATI 14, OHIO

For internal and external grinding. Ball bearing grinding wheel spindles interchangeable on corresponding sizes. For use with lathes, planer, boring mill, milling machine, etc. Vertical or horizontal position. Spindles equipped with matched precision ball bearings in dustproof housings.

SALE . . .

CHIP OIL EXTRACTORS

And Other Government-owned Surplus Centrifugal and Separator Equipment

● CENTRIFUGALS ● SEPARATORS
● CHIP WRINGERS ● PURIFIERS—OIL ● CENTRIFUGAL FILTERS

When war shortages were even more critical than today, centrifugal equipment was widely installed to "prolong tool life", "conserve cutting oils", "save vital metals". Now the same benefits are equally important, if postwar production needs are to be met quickly. Fortunately surplus centrifugal equipment is available in quantity at sale prices in most W. A. A. regional offices. Makes and sizes are standard. Check this profit opportunity today. Fill in and mail the coupon below.

MAIL TODAY!

To War Assets Administration: I am interested in Chip Oil Extractors of the following makes and size or model No.

Make ..... Size or Model No. .....

.....

I am also interested in information on the following:

• Separators • Centrifugal filters • .....

• Oil Purifiers • ..... Tel. No. .....

Name .....

Firm .....

Address ..... State 468-1

City .....

EXTRA PROFITS FOR MAKERS AND DEALERS

Do you make or sell centrifugal equipment? If so, here is an opportunity to make a two-way profit.

You can buy this equipment—your own brand—on a where-is, as-is basis—recondition or redesign it faster than you can make or purchase new models—and resell it to your regular customers. They get needed equipment sooner. You gain their good will and extra profits besides.

To negotiate purchases of this type, simply write or phone your nearest W. A. A. office below.

VETERANS OF WORLD WAR II: This surplus property is being offered to prior claimants including veterans of World War II and to commercial dealers concurrently.

WAR ASSETS ADMINISTRATION

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cleveland • Dallas • Denver Detroit • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane Cincinnati • Fort Worth

MOREY DEPENDABLE

AVAILABLE for PROMPT SHIPMENT

SPECIALS

CLEARING PRESS K-1200-30

P&W 2A Jig Borer, Latest type

MATTISON 16x24x96" High powered surface grinder

MORTON boring, drilling, milling and draw cutting traveling head planer 60" stroke

GOULD & EBERHARDT #96H Gear Hobber with Differential

Nearly All Built After 1941

GRINDERS—Surface

ARTER 8" Rotary Surface
ARTER Automatic Piston Ring
BLANCHARD #16A—Dial Type—motor drive
BLANCHARD #16—26" Chuck—motor drive
BLANCHARD #18—30" Chuck—motor drive latest type
GALLMEYER & LIVINGSTON No. 25 6" x 18"—Hydraulic—latest type
GALLMEYER & LIVINGSTON No. 35 8" x 24"—Hydraulic—latest type
MATTISON 12x14x48—Hydraulic—latest type
MATTISON 16x24x96—Hydraulic—latest type
NORTON 6"x18"—Hydraulic—latest type
NORTON 10 x 60—Hydraulic—latest type
PRATT & WHITNEY 14x60 Hydraulic—latest type
THOMPSON Type B 12x12x24 Hydraulic — latest type
THOMPSON Type C 14x16x48 Hydraulic—latest type
THOMPSON 12"x12"x24" Type B Hydraulic—latest type
THOMPSON 12"x16"x48" Type C Hydraulic—latest type

GRINDERS—Cylindrical—Plain and Universal

BROWN & SHARPE No. 3, No. 4 Univ. M.D. latest type
BROWN & SHARPE No. 5 Pl, 3x18—latest type
CINCINNATI 16x48 Plain—M.D.
LANDIS 4x12 Type H Plain Hydraulic—latest type
LANDIS 6x20 Plain—MD.
LANDIS 12x64 Universal motor drive
LANDIS 10x48 Type C Plain Hydraulic—latest type
NORTON 12 x 36 Univ.; Hydraulic—latest type
NORTON 24 x 240 Plain—motor drive

GRINDERS—Internal, Cutter and Miscellaneous

BRYANT No. 5 Internal—chucking—latest ype
BRYANT No. 16—16" Chucking—internal—latest type
BRYANT No. 16—16" Hydraulic Internal
BROWN & SHARPE No. 13 Univ. & Tool—latest type
CINCINNATI No. 2 Plain Tool & Cutter—latest type
CINCINNATI No. 2 Centerless—motor drive
HAMMOND Type WH Model A Pedestal
FOX No. 8 Swing Frame
HEALD No. 70—Internal—motor drive
HEALD No. 81 Plain Internal—latest type
LEBLOND No. 2 Univ. Tool & Cutter; latest type
PRATT & WHITNEY Contour Cutter; latest type
OLIVER Univ. and Tool
OLIVER 510 Drill
UNIVERSAL Spline shaft; Hydraulic

BORING MILLS—Horizontal

CINCINNATI GILBERT 3½" Bar; floor type—latest type
FRANKLIN 4½" Bar—SPD
FRANKLIN 4½" Bar—SPD—floor type
GIDDINGS & LEWIS No. 25T 2½" bar—latest type
GIDDINGS & LEWIS #360F—6" Bar—floor type
LUCAS No. 31—3" Bar, No. 33—4½" bar—motor drive
NILES BEMENT POND 5½" Bar
NILES BEMENT POND, 5½" bar
NILES BEMENT POND, 4½" bar—floor type
NILES BEMENT POND, 5" Bar—floor type
NILES BEMENT POND, 7" Bar—floor type
NILES BEMENT POND, 4½" Bar—Duplex floor type
P & H #10—3½" bar—floor type
UNIVERSAL 3" Bar—Timken Bearing—latest type
YODER #3—3" Bar—latest type—Timken Bearing

BORING MILLS—Vertical

BETTS 120"—2-swivel heads, motor drive
BULLARD 24", 36", 42" New Era Type—motor drive
BULLARD 54' Spiral Drive; latest type
BULLARD 86"—2-swivel heads, motor drive
KING 72", 3 heads. Latest Type
KING 72" 2-swivel heads; motor drive
NILES BEMENT POND 84" 2-swivel heads; M.D.
NILES 42", 2-swivel heads, power rapid traverse

DRILLS

ALLEN #2, 2-4 spindles
AVEY No. 2—1 to 6 spindles
BAKER #121 Single spindle
BAKER No. 121—latest type
BODINE No. 42-20 Auto
BUFFALO #16 4 Spindle
FOOT BURT SIPP #2, #3—single spindle
HENRY & WRIGHT 2 Spindle
NATCO C-13H multiple spindle
PRATT & WHITNEY No. ½B x 50" 2-spindle deep hole—latest type

DRILLS—Radial

AMERICAN 4'11", 5'11"—latest type
AMERICAN 5'13" Univ.—M.D.
CARLTON 311"—latest type
WESTERN 4'18", 5'18", 6'20"—latest type

GEAR CUTTING EQUIPMENT

BARBER COLMAN No. 3 Gear Hobber
BROWN & SHARPE No. 13 Gear Cutter
BROWN & SHARPE No. 6x60 Gear Cutter
CINCINNATI Gear Burnisher
FELLOWS No. 7, No.7A, No. 77 Gear Shapers
FELLOWS No. 624A Gear Shaper—latest type
GLEASON 3", 6", 11", 18", Bevel Gear Generators
GLEASON 10", 15" Spiral Bevel Finisher
GLEASON Bevel gear tester
GLEASON 24" Bevel Gear Planer
G & E No. 36B Gear Cutter motor drive
G & E No. 96H Gear Hobber, with differential
MICHIGAN No. 854 Gear Finisher

PLANERS

CINCINNATI 24" Crank—motor drive
CINCINNATI 36x30x5' Box table, PRT, 1 head—motor drive
CINCINNATI 120x96x20'—4 heads box Table, PRT—motor drive
CLEVELAND 48x48x16' Open side, 3 heads, motor drive
DIETRICH & HARVEY 48x48x16' 4 heads, Hydraulice—Motor drive
GRAY 8x48x16' 4 heads Motor drive
HAMILTON 42x42x20', 4 heads, motor drive
LIBERTY 24x24x8'—vari-voltage, latest type
LYND FARQUHAR 26" open side, Motor rdive
NILES BEMENT POND 96x80x20' box table 4-heads Hyd. PRT. Motor drive

MILLING MACHINES—Plain and Universal

BROWN & SHARPE #2—Light type—Latest
BROWN & SHARPE No. 2B, No. 4B standard type—Timken Bearing—latest type
BROWN & SHARPE No. 3A double overarm—M.D.
ROCKFORD No. 2B—motorized
CINCINNATI #2 Timken Bearing—Dial Type—latest type

MOREY MACHINERY C

USED MACHINE TOOLS

CINCINNATI #5 motor drive
KEARNEY & TRECKER No. 2H, No. 3H Timken Bearing—latest type
KEARNEY & TRECKER No. 2K, No. 3K Timken Bearing—latest type
KEARNEY & TRECKER No. 2A MD
KEMPSMITH No. 4 Maximiller—Timken Bearing—latest type

MILLING MACHINES—Vertical

BROWN & SHARPE No. 5—motor drive
KEARNEY & TRECKER No. 2H, No. 3K—Timken Bearing—latest type
REED PRENTICE No. 3VG—high speed—latest type

MILLING MACHINES—Manufacturing

BROWN & SHARPE No. 10, No. 12 Auto. Timken latest
CINCINNATI 45x48 Hydro. Timken Bearing—latest type
CINCINNATI 4-36 Hydro. Timken Bearing—latest type
CINCINNATI No. 0-8 Vert. — Pl. Auto. Timken Bearing—latest type—Rise & Fall
CINCINNATI No. 1-12, No. 1-18 Plain Auto. Timken Bearing—latest type
INGERSOLL 24x24x8' Planer Type—1 head
INGERSOLL 36x48x18' Planer type—4 heads
INGERSOLL 42x36x16' Planer type—4 heads
KEARNEY & TRECKER No. 1218 Auto. Timken Bearing—latest type
KENT-OWENS No. 1M Hand; M.D.—ball bearing
KENT-OWENS No. 2 RV Hand Miller—Timken Bearing—latest type
MOREY No. 12M 2-spindles Profiler and Milling Machine
OHIO Auto. 16"x72" table—Timken Bearing—latest type

THREAD MILLING MACHINES

PRATT & WHITNEY 4½x12, 6x20, 6x60 Model C latest type
PRATT & WHITNEY 6x120, 6x132—motor drive
MOREY SHIELDS 12x30, 12x60, 12x120, 12x192—latest type

SHAPERS

DILL 18" Vert. Shaper—slotter—Motor Drive
JONES 6" Vertical—latest type
LAMAIRE Vertical Hydraulic—latest type
LAMAIRE 18" Vert. Hydraulic—latest type
MOREY 10", 14" Vertical—latest type
MORTON 30" Draw Cut
PRATT & WHITNEY 6" Vertical Motor drive
PRATT & WHITNEY 10" Vertical Motor Drive
LAMAIRE Vertical Hydraulic—latest type

LATHES—Engine & Mfg.

AMERICAN 36"x15'; 36"x20'; 36"x22' bed—geared head
BRADFORD 14x42—Timken—latest
BRIDGEFORD 36"x28'; 36"x32'; 36"x35'; bed—2 carriages
HENDEY 12x54 Centers, Mfg. latest type
HENDEY No. 3 x 54 Centers, Mfg. latest type
LEBLOND 12x30 Centers Timken Bearing, latest type
LEBLOND 18x54 Centers, Timken Bearing, latest type
LEBLOND 16"x102" Centers, Timken Bearing—latest type
LEBLOND 17x14' bed, Timken Bearing, Rapid production
LEBLOND 20"x48, 20x120 Centers—Timken Bearing—latest type rapid production
LEBLOND 27x20' Centers, Timken—latest type
LEBLOND 48"x34' centers; 2 carriages; PRT—Timken Bearing
LEBLOND 27"x20' centers—Timken bearing—latest type
LODGE & SHIPLEY 16x30 Timken Bearing—latest type
LEBLOND 17x9' and 14' bed, Timken Bearing—Rapid production
MONARCH 10x20 Centers, Model EE, Timken Bearing—latest type
MONARCH 12x30 Centers, Timken Bearing, latest type
MONARCH 30"x10' bed, Timken Bearing
MONARCH 12x30 centers, Timken Bearing—latest type
NILES 36"x25' centers—2 carriages; PRT; Timken Bearing
NILES 36"x18 Timken Bearing, latest type
PITTSBURGH 50"x30' bed—M.D.
REED PRENTICE 14x30 Timken Bearing—latest type
RIVETT Style 918 Bench Type—ball bearing—M.D.
SENECA FALLS 8"x60" LoSwing Timken Bearing—latest type
SEBASTIAN 20"x8' bed—Timken Bearing—latest type

LATHES—Turret

BARDONS & OLIVER No. 3—latest type
BARDONS & OLIVER No. 5 Univ.; Timken Bearing; chucking
BARDONS & OLIVER No. 7 Univ.; Timken Bearing; chucking
CINCINNATI-ACME 5W Timken Bearing—latest type 2" Bar Cap.
GISHOLT No. 2L Univ. Timken Bearing
GISHOLT No. 3, No. 4 Univ. Timken Bearing—latest type
GISHOLT No. 3D Simplimatics—Timken Bearing latest type
JONES & LAMSON No. 3, No. 5, No. 7C Univ.; Latest Type. Timken Bearing
LIBBY 1H-5 Timken Bearing—latest type 5½" hole
MOREY No. 2G, 1" Cap. Timken Bearing
MOREY No. 3 Univ.; 1½" Cap. Timken Bearing
MOREY No. 4 Univ.; 2" Cap. Timken Bearing
WARNER & SWASEY No. 2A, No. 4A, Univ.; Timken Bearing—latest type
WARNER & SWASEY No. 3, No. 4, No. 5, Univ.; Timken Bearing—latest type
WARNER & SWASEY No. 4A Univ.; Hollow Hex:; Timken bearing

AUTOMATIC SCREW MACHINES

CLEVELAND ⅞" to 2½" Model A
CONOMATIC 3½"-4 spindle—latest type
NEW BRITAIN-GRIDLEY No. 65; 6 spdle; chucking; latest type

PRESSES

CLEARING Type K-1290-30 Knuckle Joint, 200 Tons—latest type

MISCELLANEOUS

AMERICAN V2-6 Vert. Broach
WATSON STILLMAN Hyd. Straightening Press 20 Ton
GREENARD No. 6 Arbor Press
BLISS No. 6 Arbor Press
TREADWELL Pipe Threader 12"
MITTS & MERRILL No. 5 Keyseater
PEERLESS 6x6 Hack Saw—Auto. Feed
MARVEL No. 9, No. 9A hack saw
PEERLESS 14"x14" Hack Saw
CAMPBELL No. 401 Cutamatic Wet Abrasive Cutting Machine, 6"
LUCAS #38 Cold saw
LEBLOND #2 Deep Hole Borer
PRATT & WHITNEY No. 2A Jig Borer—latest type
VERNON Jig Borer
MORTON 60" Combination Traveling head planer, milling & drilling
MOTCH & MERRYWEATHER #3 Cold Saw Hyd.—latest type
BRINNELL Auto. Direct Reading Hardness Testing Machine
RHENBERG JACOBSEN Centering Machine

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BALER
Model 24-P Logemann Scrap Metal Baler Charging Box 20" x 32" x 100", Bale Size 16" x 20" x 24". Compressor, Pump, Motor

BENDING ROLLS
14" x ¾" Southwark Pyramid Type, M.D.
16' x ½" Kling Bros. Pyramid Type, M.D.

CORRUGATING MACHINES
10' Robinson Toggle Press
12' Robinson Toggle Press
10' Rotary Corrugating Machine
12' Rotary Corrugating Machine
Dies for 1¼" and 2½" Corrugations
72' Single crimp dies
12' Double crimp dies

CRANES — OVERHEAD ELECTRIC TRAVELING

8 ton Niles	20'	Span.	220 Volt D.C.
5 ton OET	38'	Span.	230 Volt D.C.
5 ton Shaw-Box	65'	Span.	550/3/60 A.C.
5 ton Northern	26'	Span.	230 Volt D.C.
6 ton American With two 3-ton trolleys	77'	Span.	220/3/60 A.C.
10 ton P & H	57'	Span.	230 Volt D.C.
10 ton N-B-P With 2-5 ton Hoists	75'	Span.	110 Volt D.C.
10 ton P & H	71'	Span.	220/3/60 A.C.
10 ton Case	80'	Span.	220/3/25 A.C.
35 ton Bedford	50'	Span.	220/3/60 A.C.
200 ton Alliance With 25 ton Auxiliary	100'	Span.	230 Volt D.C.

DRAW BENCHES
20,000# Vaughn Machinery Co. Draw Bench M.D. Length, Die Head to Carriage, 52 ft.
50,000# Aetna Chain Type Draw Bench, M.D.
100,000# Aetna Standard Draw Bench
300,000# Aetna Standard Draw Bench

DRILL—RADIAL
7' American Triple Purpose, 15" Dia. Column, 220 Volt D.C.

FORGING MACHINES
1", 1½", 2", 2½", 5", 6", 7", 8", 9" National, Ajax, Acme Forging Machines

GRINDERS
No. 2 Cincinnati Centerless Grinder
No. 3 Cincinnati Centerless Grinder

HAMMERS—BOARD DROP
1200, 2000, 3000, 4000# Chambersburg
1500, 2000, 2500, 4000 & 5000# Erie
400, 2000 & 3000# Billings & Spencer

NO. 6A NATIONAL MAXIPRES
Bed Area 46½" x 56"
Stroke 14"
Weight 360,000 lbs.

HAMMERS—STEAM DROP
1200, 1500, 2000, 3000, 4000# Erie & Chambersburg

HAMMERS—STEAM FORGING
1500 lb. Erie Steam Forging Hammer

JIG BORER
#5 Reed Prentice Jig Borer & Vertical Boring Machine, 30" Column, Pump, Motors & Regular Equip. Incl.

LEVELLERS—ROLLER
16" Torrington Roller Leveller, 9-Roll Motor Driven, Capacity ¾" thick plate 16" wide
54" McKay Roller Leveller. Arr. for Geared Motor Drive

PRESSES—HYDRAULIC
60 ton Elmes Four Column Hydraulic Press 24" Stroke, 48" Daylight, 27" x 30" Between Columns, Pump & Motor Incl.
300-ton Wood Hydraulic Flanging Press, Platens 5'6" x 18'1". For flanging cold plates ⅜" thick x 15' long
800 ton Watson-Stillman Hydraulic Press, 42" Stroke, 144" x 72" Platen Size. Complete with electrical equipment
2000 ton Bliss Hydro-Dynamic Press Tie Rod Construction, 18" Stroke 54" x 55" Bed Area. Complete with Pump and Elecl. Equip.

PRESSES—HYDRAULIC WHEEL
300 ton Caldwell Hydraulic Wheel Press 38" Between Bars
500 ton N-B-P Hydraulic Wheel Press 48" Between Bars. Complete with Pump and Motor.

PRESS—REDUCING
No. 88 Bliss Straight Side Reducing Press, 250 ton Capacity, 21" Stroke, Bed Area 28"x27'

PRESSES—STRAIGHT SIDE
#310 Toledo 440 ton Double Geared Twin Drive Press 10" Stroke 36" x 36" Bed Area
#3½ Bliss Double Crank Geared Press 36" Between Uprights, 2" Stroke

PUMP
3½" x 14" Deane Vertical Triplex Pump 100 GPM at 1500# Pressure

PUNCH & SHEAR COMBINATIONS
Style EF Cleveland Punch & Shear 72" Throat. Capacity 1¼" thru 1"
No. 2 Hilles & Jones Punch & Shear Double End 22" Throats. Cap. 1" x 1"
No. 3 Hilles & Jones Punch & Shear Double End, Geared Motor Drive, Capacity shear plates 1½" x 12', angle 6 x 6 x 1"

ROLLING MILLS
9" Hot Mill, Two High for Strip Steel, Complete with accessories
6" x 4" Waterbury Farrel Single Stand Two High
16" x 32" Farrell Fdry. Single Stand Two High
24" x 46" Four Stands Two High
28" Two High Cold Mill, Three Stands, Capable of handling sheets 20" x 70' wide, Motor Driven
12" Merchant Bar Mill—Three High

ROLLS—PLATE STRAIGHTENING
96" Bertsch Plate Straightening Roll, 7 Rolls 18" Dia. Capacity ¾", Motor Drive incl. AC Motor, New 1942
110" Hilles & Jones #4 Plate Straightening Roll, Size 14" Dia. Rolls. Capacity 1½" Plate

ROLL—TAPER FORGING
No. 5 Ajax Taper Forging Roll. Complete with elecl. equip. Late model air clutch operated

SHEAR—ANGLE
8x8x1" Double Angle Shear. Complete with Turntable

SHEARS—ROTARY
#5 Quickwork Rotary Shear, 48" Throat ½" Capacity, Motor Driven
#6 Quickwork Rotary Shear, 48" Throat ¾" Capacity, Motor Driven

SHEARS—SQUARING
60" x ⅜" Long & Alstatter Squaring Shear. Motor Driven

STRAIGHTENERS
#2 Sutton Straightening Machine Motor Driven, including 50 hp. A.C. Motor, capacity 3¼" to 3½"
⅝" Shuster Straightener & Cut-off Machine, M.D. With 20" Cut-off
½" Shuster Straightening & Cut-off Machine, Belt Drive, 20' Cut-off

STRANDING MACHINE
Larmuth Type Stranding Machine with 7 Cradles for 6½" x 3½" Traverse Bobbin

TESTING MACHINE
20,000 Riehle Bros. Universal Testing Machine, Belt Driven

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QUALITY *Machine Tools*

NOW IN STOCK

10" Monarch Sensitive Precision Tool Room Lathe, actual swing 12½", distance between centers 20"; motor in base with hydraulic transmission giving speeds from 25 to 2500 RPM. New in 1940.

Lake Erie 2500 ton Forming Press, 60 x 58 F. to B. x R. to L. between columns; 95½ x 120 F. to B. x R. to L. bottom platen, maximum daylight 42", stroke 36". Condition equal to new.

AUTOMATICS
5½" Cleveland Model A, single spindle.
No. 61 New Britain, 1⅝" capacity.
16" x 33" Fay Automatic Lathe.
1" x 5" New Britain, six spindle.
⅞" Cleveland Model M, four spindle.
No. 00, 0, 2G Brown & Sharpe.

BROACHES
Lapointe CPC 24 Hydraulic Vertical.

DRILLS
3' Cincinnati Gilbert, motor on arm.
4 Ft. Canedy-Otto Radial.
5 ft. Carlton Radial, enclosed head.
21" Buffalo Stationary Head.
No. D2 Colburn, single spindle.
42" Barnes, sliding head.
Allen Sensitive Drill, four spindle.
No. 11 Natco Multiple Drill, 16 spindle.
★ No. 3 Bausch Multiple, 20 Spindle, No. 2 Morse Taper, Rectang. Head 20" x 40".

GEAR CUTTERS
No. 7 Fellows Gear Shaper, m.d.
No. 6, 61 Fellows Gear Shaper, m.d.
No. 5AC Lees Bradner Gear Hobber.
6" Gleason Str. Bevel Gear Generator.
No. 5—48" Cincl. Automatic Gear Cutter.

GRINDERS
36" x 168" Mattison Surface Grinder.
No. 22 Heald Rotary Surface Grinder.
No. 16—26" and No. 16—30" Blanchard Surface Grinder.
No. 72A3 Heald Gagematic Int. Grinder.
No. 70 and 75 Heald Internal Grinders.
No. 13 Brown & Sharpe Universal & Tool Grinder.
12" x 36" Cincl. Universal, Hydraulic.
10" x 72" Norton Cylindrical Grinder.
No. 2 Cincinnati Centerless Grinder.
★ No. 3 Cincinnati Centerless, m.d.

JIG BORERS
★ No. 30A Fosdick, New in 1942.

LATHES, ENGINE
16" x 8' American, g.h.
18" x 10' Hendey, g.h.
24" x 10' American, C.D.
24" x 30' Lodge & Shipley, g.h.
48" x 12' Lodge & Shipley, C.D.
IMP and LR Lo-Swing Lathes, m.d., new in 1940.
15" x 30" Lipe Carbo-matic, new in 1943.

LATHES, TURRET
No. 3A Warner & Swasey, Timken Bear.
No. 1B Foster, G.H.
No. 4 Warner & Swasey, g.h., new 1942.
No. 6D Potter & Johnston Automatic Chucking and Turning Machine.

MILLS
No. 36 Van Norman Ram Type, New 1942.
No. 4A Brown & Sharpe Universal, s.p.d.
No. 4 Cincl. Universal, rect. overarm.
No. 3B Milwaukee, plain, m.d.
No. 2 M.H. Cincinnati Plain, m.d.
No. 2H Milwaukee Vert., motor in base.
No. 0-8 Cincinnati Plain Automatic, m.d.
★ 18" Cincinnati Plain, m.d., new 1943.
No. 2209 Milwaukee, Table 22" x 158".
No. 3-36 Cincl. Hydromatic Duplex, m.d.
No. 6 Whitney Hand Mill.
4" Pratt & Whitney Spline Mill.
42" Bullard Vertical Boring Mill.

MISCELLANEOUS
Reliance Sand Blast No. 193A.
No. 100 Micromatic Hydrohoner.
Schraner Crankshaft Lap. Mach., Mod. B.
8" x 7" Troy Vertical Steam Engine.
No. 72 Etna Rotary Swaging Machine.
Gray Nibbler, ¼" capacity.
Barrett Oil Separator.

PLANERS AND SHAPERS
24" American Crank Shaper, c.d.
★ 6" Pratt & Whitney Vertical Shaper.
38" x 38" x 14' Ohio Planer.

SAWS
9" x 9" Peerless, Hydraulic.

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EASTERN BRANCH: 44 WHITEHALL ST., NEW YORK
MEXICO OFFICE: *Avenida Independencia No. 36B, MEXICO, D. F.*

THE CLEARING HOUSE

EASTERN REBUILT MACHINE TOOLS

RADIAL DRILLS

3' American Triple Purpose, m.d. on arm, 11" col.
3' American Sensitive, belt
3'11" Carlton, m.d. on arm, latest
3' Fosdick Sensitive, belt
3'9" Cincinnati-Bickford, m.d. on arm, latest
4' American Triple Geared, m.d.
4' No. 1 Bickford, gear box
4'11" Carlton, m.d. on arm, latest
4'13" American Hole Wizard, m.d. on arm, latest
4'11" Cincinnati-Bickford, m.d.
4'13" Cincinnati-Bickford, gear box
4' Fosdick, gear box
4' Niles-Bement-Pond, m.d.
5'13" American Triple Geared, gear box
5' Cincinnati-Bickford Plate Hole Driller, m.d. on arm
5' Dreses 13" col., gear box
5' Prentice, m.d.
6'15" American Triple Purpose, m.d. on arm
6'15" American Triple Purpose, m.d. on base
6'17" American Hole Wizard, m.d. on arm, railroad type base, latest
6'15" Carlton, gear box on base, double base
6' Cincinnati-Bickford Full Universal, gear box
6' Niles-Bement-Pond Semi-Universal, m.d.
6'16" Western, m.d.
6' Reed-Prentice, gear box
7'15" American Triple Purpose, m.d. on arm
7'15" Cincinnati-Bickford, m.d.
8'16" American Triple Purpose, m.d. on arm
8'16" American Triple Purpose, m.d. on base
10'22" American Triple Purpose, m.d. on arm

UPRIGHT DRILLS

24" Barnes All Geared Self-Oiling, belt
30" Rich H.D., m.d.
32" Aurora, belt
H3 Barnes Hydram, m.d.
No. 25 Foote-Burt, m.d.
No. 36HO Baker H.D., m.d., latest
D4 Colburn H.D., m.d.
D8 Colburn H.D., m.d.

PLAIN CYLINDRICAL GRINDERS

6x18" Cincinnati Hydraulic, m.d.
No. 10 Brown & Sharpe, m.d.
6x18" Landis, m.d.
6x32" Fitchburg Type A, m.d., latest
8x36" Brown & Sharpe, belt
8x36" Cincinnati Saddle Type, m.d.
10x24" Landis, m.d.
10x36" Cincinnati Hydraulic, model EA, m.d.
10x48" Brown & Sharpe, belt
10x48" Landis Type C Hydraulic, m.d., latest
10x72" Landis, m.d.
12x36" Landis, m.d.
12x36" Modern, belt
12x36" Cincinnati, belt
12x42" Landis, belt
12x48" Modern, m.d.
12x48" Cincinnati Self-Contained, m.d.
12x72" Brown & Sharpe, belt
12x96" Landis, m.d.
14x18" Cincinnati Self-Contained, m.d.
14x48" Cincinnati Self-Contained, m.d.
14x72" Norton, motorized
16x72" Landis, m.d.
16x216" Landis Type B Hydraulic, m.d., latest
20x120" Landis, m.d.
26x96" Landis, m.d.

UNIVERSAL CYLINDRICAL GRINDERS

12x30" No. 2 Brown & Sharpe, belt
12x36" Cincinnati, belt
16x68" Landis, belt

INTERNAL GRINDERS

No. 16-22" Bryant Hydraulic Hole, m.d., latest
No. 16RS Bryant Hydraulic, m.d., latest
No. 20 Bryant, belt
No. 24-20" Bryant Hydraulic, m.d.
No. 72A3 Heald Gagematic, m.d.
No. 72A3 Heald Sizematic, m.d.
No. 74 Heald Hydraulic, m.d.
No. 6 Bryant, belt
No. 9 Cincinnati, belt
No. 10 Bryant, belt
No. 72A3 Heald Plain Internal, m.d.

PLAIN MILLING MACHINES

No. 2 Cincinnati Plain, cone
No. 000 Brown & Sharpe, m.d., latest
No. 1A Milwaukee Mfg., m.d. in base
No. 1M Cincinnati, m.d.
No. 2 Cincinnati H.S. Dial Type, m.d., latest
No. 3B Brown & Sharpe, m.d.
No. 4 Cincinnati M.S. Dial Type, m.d., latest
No. 4 Cincinnati H.P., m.d.
No. 4B Brown & Sharpe, m.d. in base
No. 4B Brown & Sharpe, m.d.
No. 4S Cincinnati, m.d.
No. 4 H Milwaukee, m.d. in base
No. 5B Heavy Brown & Sharpe, m.d.
No. 5B Heavy Brown & Sharpe, m.d.

UNIVERSAL MILLING MACHINES

No. 2A Brown & Sharpe, m.d.
No. 3A Brown & Sharpe, m.d.
No. 4A Brown & Sharpe, m.d.
No. 4 Cincinnati H.P., m.d.
No. 4B Milwaukee, m.d.

MANUFACTURING MILLING MACHINES

No. 3-36 Cincinnati Duplex Hydromatic, m.d.
No. CT-36 Lees-Bradner Thread, m.d., latest
No. CT-54 Lees-Bradner Thread, m.d., latest
No. 2-24 Cincinnati Plain Automatic, m.d., latest
No. 34-36 Cincinnati Duplex Hydromatic, m.d., with tracer control, latest type
No. 4-48 Cincinnati Plain Hydromatic, m.d., latest
4½x12" Pratt & Whitney Thread, belt
6x14" Pratt & Whitney Thread, belt
6x20" Pratt & Whitney Type B Geared Head Thread, m.d.
6x48" Pratt & Whitney Thread, belted m.d.
6x80" Pratt & Whitney Thread, belted m.d.
18" Cincinnati Plain Automatic, m.d.
24" Cincinnati Plain Automatic, m.d.
24" Cincinnati Duplex Automatic, m.d.
24"x6' Ingersoll Slab, m.d.
28" Cincinnati Plain Automatic, s.p.d.
36"x36"x14' Bement Slab, m.d.
54"x54"x10' Liberty Planer Type, m.d.
Hall Planetary Thread, m.d.
Burr Mfg., m.d.
No. 2 and 12 Pratt & Whitney Lincoln Type, belt

ENGINE LATHES

14"x8' Monarch Geared Head, m.d. inbase, taper
14"x6' Pratt & Whitney, cone, taper
14"x8' Pratt & Whitney, cone
14"x102" centers Hendey, m.d., latest
16"x12' Reed-Prentice Geared Head, m.d., latest
18"x7' Hendey Geared Head, m.d., taper
18"x8' Lodge & Shipley, cone
18"x8' Rockford, cone
19/38"x16' LeBlond Sliding Bed Extension Gap Lathe, m.d., taper
20"x8' Springfield Geared Head, m.d., taper
20"x12' Niles, cone
23"x12' LeBlond Geared Head, m.d., taper
24"x10' American Geared Head, m.d., taper
24"x16' Niles, cone
25"x10' LeBlond, cone
26"x14' Bridgeford, cone, taper
27"x16' American Geared Head, m.d., taper
27"x16' LeBlond, cone, taper
30"x12'6" Niles-Bement-Pond Geared Head, m.d., taper
30"x13'6" Niles-Bement-Pond Geared Head, m.d.,
30"x16' Bridgeford Geared Head, m.d., taper
30"x26' Lodge & Shipley Selective Head, m.d.
30"x28' Niles "Time Saver" Geared Head, m.d., Tatest
36"x10' Putnam, motorized
36"x12' Lodge & Shipley Selec. Head, m.d.
36"x12' Wright, cone
36"x21' centers Putnam Geared Head, m.d.
36"x28'6" Niles H.D. Geared Head, m.d., taper, latest
36"x30" Lodge & Shipley Selec. Head, m.d.
36"x32' centers Putnam Geared Head, m.d.
36"x36'6" Niles H.D. Geared Head, m.d., latest
42"x26' American Geared Head, m.d., p.r.t.

MANUFACTURING LATHES

No. 9 Heavy LeBlond Multi-Cut, m.d.
3½x36" LoSwing
3x80" LoSwing, m.d.
4x60" LoSwing, m.d., hardened ways
8x84" LoSwing, m.d.
8x132" LoSwing, m.d.
9x12" Sundstrand Mfg., s.p.d.
9x14" Porter-Cable Mfg., m.d.
13x24" Coulter Automatic Threading, m.d.
13x96" Coulter Automatic Threading, m.d.
15"x6' Automatic Threading, belt
17x124" centers LeBlond Rapid Production, m.d. in base, latest
20"x8' LeBlond Mfg., m.d.
20"x16' American Geared Head, arr. for spindle boring
Niles-Bement-Pond Quartering Machine, new, m.d.

GEAR MACHINERY

No. 18 Fellows Gear Shaver, m.d.
Model T Barber-Colman Gear Hobber, m.d., latest
Model A Barber-Colman Gear Hobber, m.d., latest
3" Gleason Straight Bevel, m.d.,
6" Gleason Straight Bevel, m.d.
8" Gleason Mfg. Type Straight Bevel, m.d.
9" Pratt & Whitney Hydraulic Spur Gear Grinder, m.d.
10" Pratt & Whitney Hydraulic Spur and Helical Gear Grinder, m.d.
11" Gleason Straight Bevel Gear Generator, belt
12" Gleason Straight Bevel Gear Generator, m.d.
48" Cleveland Gear Hobber, m.d.
Gleason Spiral Bevel Gear Rougher, s.p.d.
No. 2HS Lees-Bradner Spur & Helical Gear Grinder, m.d.
No. 3-26" Cincinnati Spur Gear Cutter
No. 3 Heavy Brown & Sharpe Gear Cutter, m.d.
No. 4-36" Brown & Sharpe Spur Gear Cutter, s.p.d.
No. 6-60" Brown & Sharpe Spur Gear Cutter, m.d.
No. 13LS Fellows Gear Lapper, m.d.
No. 36S Gould & Eberhardt Gear Cutter, m.d.
No. 6I Fellows Gear Shaper, belt
No. 64-S Fellows Gear Shaper, m.d.
No. 71A Fellows H.S. Gear Shaper, m.d.
Cincinnati Gear Burnisher, m.d.
Cross Gear Tooth Rounder, belt
Schuchardt & Schutte Gear Tooth Rounder, belt
No. 12 Barber-Colman Double Overarm Gear Hobber, long bed type

CENTERLESS GRINDERS

No. 2 Cincinnati, m.d., latest, 1942 machine
No. 2 Cincinnati, m.d.
Cincinnati Valve Seat Grinder, m.d., cap. ⅜" valve stems

CYLINDER GRINDERS

No. 50 Heald, m.d., brand new, in original crates
No. 73 Heald Airplane Cylinder, m.d., brand new, in original crates
No. 55 Heald, m.d.
No. 55 Heald, belt
No. 65 Heald, belt

DISC GRINDERS

7½ H.P. Standard Elec. Tool, model 101, new
No. 4 Gardner Disc, m.d.
No. 20 Gardner Comb. Disc Grinder & Roll Sander, m.d.

More than 1500 machines in stock for immediate shipment.

THE EASTERN MACHINERY CO.

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IMMEDIATE DELIVERY

LATHES

8"x108" Fitchburg Lo-Swing
16"x8' Lodge & Shipley Selective Geared Head
36"x30' Lodge & Shipley Triple Geared Selective Head, two carriages
42"x18' Putnam Geared Head

MILLING MACHINES

No. 2-H Milwaukee Vertical, latest type
No. 4-B Milwaukee Vertical
No. 4 Cincinnati Plain
No. 118 Van Norman Production
No. 27-MB Smalley-General Thread
No. 6 Lees-Bradner Thread
26"x25"x12' Ingersoll Adjustable Rail
42"x36"x18' Ingersoll Adjustable Rail, four heads

VERT. BOR. MILLS

42" Bullard New Era
72" Colburn

HOR. BOR. MACHINES

No. 50 Universal, 5" Bar, 60"x144" table, 72" bar to table, 120" bar to outboard support
No. 32 Lucas, 3¾" Bar

GEAR HOBBERS

No. 4 Pfauter, 72" capacity

PLANERS

36"x36"x8' Woodward & Powell
60"x38"x8' Gray Spiral Geared

AUTOMATICS

1⅝" Conomatic, 8 spdl.

TURRET LATHES

No. 3 Warner & Swasey Univ., A.C. & BF. (1943), 6 in stock
No. 4, No. 6 Warner & Swasey
No. 1-A Warner & Swasey, Timken Brg., covered ways
6.2" Denver, chucking machine
No. 6R Denver Univ., 2 9/16" capacity
18" Libby, 3½" H.S.
No. 2 American Brass Lathe

GRINDERS

No. 72 Heald Internal
Oliver Ace Univ, Tool & Cutter
10x24 Landis Universal

HILL-CLARKE

MODERNIZED & MOTORIZED CYLINDRICAL GRINDERS

SIZES AVAILABLE

10 x 18	14 x 36	16 x 50
10 x 36	14 x 50	16 x 72
10 x 50	14 x 72	18 x 96
10 x 72	14 x 96	24 x 96
10 x 96		24 x 240

HILL-CLARKE MACHINERY COMPANY
647 Washington Boulevard
Chicago 6, Illinois

IN STOCK

BORING MILLS

96" Cincinnati; Massive Pattern
61" Bullard Maximill
42" Bullard, New Era type
3½" bar Lucas horizontal
3½" bar Universal horizontal

DRILLS

3' American Hole Wizard radial
4' Carlton radial
4' Hammond radial
5' Western radial
34 spdl. No. 30 Natco multiple
20 spdl. No. 4 Baush multiple, 2" spdl. No. 3 taper, hydraulic feed
24", No. 25 Foote Burt heavy
24" & 28" Aurora, SH, BG, PF

GEAR CUTTERS

Nos. 3 & 12 Barber Colman hobbers
Nos. 12H, 16HS & 18H G. & E.
Nos. 7 & 61 Fellows shapers
Nos. 1 & 5A Lees Bradner hobbers
11" Gleason bevel generator
18" Gleason testers & lappers
No. 3 Barber Colman hob grinder

GRINDERS

36", No. 18 Blanchard surface
16", No. 10 Blanchard surface
6"x18" Norton hydr. surface
6"x18", No. 2 B. & S. surface
No. 2 Brown & Sharpe universal
No. 104 Rivett internal
No. 72A3 Heald Sizematic internal
No. 75A Heald, cross feeding head
No. 2 Cincinnati centerless
6"x18", No. 10 B & S elec. hydraulic
6"x18" Norton hydraulic
6"x18" Landis hydraulic

HAMMERS

2000 lb. Chambersburg board drop
2000 lb. & 3000 lb. Billings & Spencer board drop

LATHES

36"x16' Bridgeford geared head
30"x60" Lehman Hydratrol
14"x6' & 16"x6' American grd. hd.
14"x6' Hendey grd. hd. tool room
17"x6' Leblond grd. hd. Mfg.
14"x18" Monarch Magnamatic
14"x19" Fay automatic
15"x22½" Sundstrand auto. stub.
8" & 12" Sundstrand stub.

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Nos. 2B & 3B Milwaukee Plain
No. 2 Brown & Sharpe vertical
No. 2½B Milwaukee vertical
No. 4—30 Cincinnati Hydromatic
Type C. Hall planetary thread
No. CT36 Lees Bradner thread
30", 42" & 84" Ingersoll rotary

MISCELLANEOUS

No. 112A Excello borer
No. 401 Campbell abrasive cutoff
Nos. XB12, 3 & 4 Oilgear broaches
No. M1 Micromatic Hydrohoner
1400' Sullivan air compressor
32" Morton draw cut shaper
32"x32"x8' Cincinnati planer
30"x30"x12' Cleveland planer
6" Stevens die slotter

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Immediate Delivery

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Horizontal
2½", 4" Binsee
Vertical
66", 120" Niles
54" Colburn M.D., 2 heads

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MONA MEMBER

24" Bullard New Era Vertical
No. 1L Gisholt Universal, M.D.
Foster Nos. 4, 5, 6, 1B, 3B, M.D., Univ.
J. & L. 2¼"x24", 3¼"x36"
Acme, 3¼", M.D.

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P. & W. 14", B.B. Vert., M.D.
Blanchard 30", M.D.; Modern 12x48", M.D.
Norton Hydraulic 12"x18", M.D.
Heald No. 72A3 Gagematic
Norton 50"x28', M.D.
Landis 6x20", Hydraulic, M.D.
Bryant No. 12, M.D.
Nos. 50, 55, 60 Heald Int. Hydraulic, M.D.
B. & S. Nos. 1, 3, Univ.
B. & S. Nos. 10, 11, S.P.D.
12" Heald Rotary, M.D. 12" Arter
Heald No. 25A Rotary
B. & S. and No. 2 Surface, M.D.

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P. & W. 1x18, 1¼x18 Automatic Lathes
McCabe 26-42"x14'
24"x12' Boye & Emmes 3 step cone, D.B.G.
20"x14' Rahn-Larmon, raised to 24"
14"x6' Hendey, 16"x6'
9" LeBlond Automatic
36"x30' Putnam, M.D.
36"x20' Putnam, S.C.G., D.C., M.D.
Putnam 42"x16', M.D.
30"x26' L. & S. 12-speed, M.D.
32"x35' Wickes Grd. Hd.

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B. & S. Nos. 00, 0
B. & S. No. 2 Hand Screw Machine
Cleveland Model A, ½", ⅜", 1¼", 2"
Cleveland Model B, 1", 2"
⅞" Cone 4 Spindle
P. & J. 6A, M.D.
Five Spindle Davenport Auto, 9/16" cap.

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4' Amer. Hole Wizard, M.D.

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Cincinnati No. 2 Universal
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P. & W. Nos. 12, 30 Profiler, M.D.
K. & T. B. & S. Nos 2, 3, like new
B. & S. Nos. 2, 3, Vert.
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6 spindle Avey Drill, 15" overhang
Rochester No. 5½B Hammer
P. & W. 6" Vert. Shaper
Pipe Machines, 4", 6", 8", M.D.
N.B.P. 15" Slotter, M.D.
Thompson-Gibbs Spot Welders, 17 KVA
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Boring Mills, 3" Giddings & Lewis
2½" Cleveland, with motors
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Compressors, 150 & 500 C.F.M.
Drills, #4, 5 M.T. 24" Production,
#13 Natco Mult., 4' Radials
Grinders, #70 & #75 Heald Internal,
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Disc., #7½ Gardner, #1 LeBlond
T&C
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Lathes, #2, 4, 6, 2A, 3A W&S, motors
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1½B, 3B K&T, motors
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BUFFERS, Gardner 4 H.P. 230 volts D.C.
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HAMMER, Bd. Drop, 1000# B & S
LATHES, 18"x6' Greaves-Klusman, grd. hd., M.D.
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Double and Single Feed Rolls for punch presses
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See our partial list page 241 June 13th Issue

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Single and Double End Punches, total of 12
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1—2 HP. U.S. Flexible Shaft Grinder, 3/60/440.
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10' NILES VERTICAL BORING MILL
80" dia. Table—Vee Drive

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138 cast steel spools 10½" dia., 5" traverse.
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Clearing Knuckle Lever Embossing Press, 800 ton capacity, 6" stroke, 36x42 bed. Shut height 32", Speed 20 strokes per min. Slide adjustment ½" by wedge. Bliss No. 87 straight side. single crank reducing press, 14" stroke, 27x27 bed, 25" shut height, double geared.

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200KVA Ram Type Federal welder, 54" throat, G. E. Thyratron control, 440 Volt, 60 Cy.

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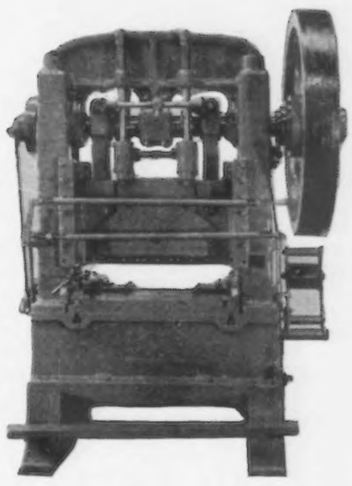

Tonnage capacity 100
Maximum stroke 1"
Diameter crankshaft at bearings 5"
Width between uprights 42"
Distance bed to slide, stroke down, adj. up 10¼"
Area of bolster plate front to back, right to left 30"x41"
Thickness of bolster 3"
Opening in bed front to back, right to left 21"x34"
Equipped with special strip type feed
Arranged for belted flywheel motor drive
Area of slide F to B x R to L 4"x37"

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Compressor rebuilt. Motor and Exciter completely re-wound. New Panel 1943-4.

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1—420 cu. ft. Schram diesel portable air compressor
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2—20 ton Vulcan Standard gauge gasoline Locomotives
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1—45 ton Plymouth Standard gauge diesel mechanical Locomotive
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1—20 Yd. Western Air Operated Dump Car

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Coping type — Single end

200 ton capacity Age 1943
Complete with punch, splitting, shear, angle shear attachments
Will Punch:
2¼" through 1⅛"
Weight 27,000 pounds
15 HP Motor 3/60/220-440
Will Shear:
2½" rounds; 9x¼" flats
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6 x 6 x ¾" Angles

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Chi-Pneu. 26" x 15" x 18" — OCE-2200 CFM, New 1942.
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Above equipped with 3-60-2300 Synchronous Motors and complete with all Accessories.
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Curtis 24' Span

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P & H 34' Span

2-Ton
Louden 19' 2" Span
Box 36' 9" Span
Detroit 28' Span

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P & H 25' Span
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Manning, Maxwell & Moore 48' ¾"
"Conco" 48' and 26' 6" Spans

5-Ton
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Milwaukee 66' 9" Span
Manning, Maxwell & Moore 70'
Manning, Maxwell & Moore 47' 4"
Shaw 36' Span
Champion 37' 6" Span
American 70' Span
American 47' 4" Span

6-Ton
P & H 77' Span
American 77' Span

7½-Ton
Shepard 36' Span

10-Ton
Shaw 68' Span
Shaw 73' Span
P & H 87' 6" Span
P & H 80' Span
P & H 30' Span
Northern 71' 10⅛" Span
Northern 60' Span
Morgan 55' 6" Span
Morgan 39' 5"
Morgan 52' 3" Span
Milwaukee 66' 9" Span
McGill 85' Span
Lane 50' Span
Emsco 75' Span
Dominion 35' Span
Cleveland 38' ½" Span
Cleveland 50' Span
Alliance 71' 10⅛" Span
Alliance 58' 9" Span
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Erie 60' Span
Chesapeake 55' 6" Span
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Morgan 60' Span
Cleveland 65' Span

25-Ton
Whiting 106' Span
Tysaman 60' Span
P & H 70' Span
Morgan 52' 3" Span
Cleveland 106' Span
Case 63' Span
Bedford 50' Span

30-Ton
Whiting 80' Span
P & H 80' Span
P & H 60' Span
Morgan 30' Span
Case 41' Span

35-Ton
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Northern 22' Span

50-Ton
Shaw 95' Span
Shaw 69' 10" Span
Dominion 80' Span
Cleveland 71' 10½" Span

75-Ton
Morgan 59' 2½" Span
Alliance 78' Span
Alliance 37' Span

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American 40' 6" Span

125-Ton
Morgan 100' Span

150-Ton
Whiting 30' Span

175-Ton
Morgan 54' Span

200-Ton
Alliance 100' Span

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"Stewart" Gas Fired Recirculating Box Type Furnaces — Heat Chambers 20" x 20" x 20"—Max. heat range 1100° F. — complete with temperature controls, blower and motor — excellent condition.

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RE-NU-BILT

Guaranteed

ELECTRIC POWER EQUIPMENT

A.C. MOTORS

3 phase — 60 cycle

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HP	Make	Type	Volts	Speed
1—2500	G.E.	MT	6600	258
1— 800	Al. Ch.		440	885
1— 600	G.E.	MT-422	2200	591
1— 600	Whse.	CW	440	400
1— 600	Cr. Wh.	131-AQ	2200	507
1— 500	Al. Ch.	Any 36	2200	590
1— 350	G.E.	MT-442Y	2200/4000	253
1— 300	G.E.	IM	220/440	485
1— 250	G.E.	MT-424Y	4000	257
1— 225	G.E.	IM-17	550	720
1— 200	G.E.	IM	2200	600
1— 200	G.E.	IM	440	450
1— 100	G.E.	IM	550	720
1— 100	G.E.	MTC-5552	550	685

SQUIRREL CAGE

1— 725	G.E.	KT	13200	590
1— 400	G.E.	IE-15B	2200	1165
1— 300	G.E.	IK-17	440	900
1— 200	Al. Ch.		2300	1175
2— 200	G.E.	IK	2300	1175
1— 200	Whse.	C8	2200	1800
1— 200	G.E.	IK-17	440	580
1— 200	G.E.	IK	550	600
3— 150	G.E.	K-63258	440	1200
1— 150	Whse.	CS-954A	550	400
2—175/112	G.E.	IK-16	440	900/720
1— 100	G.E.	IK-Vert.	2300	450

SYNCHRONOUS

1— 800	G.E.	TS-7650	4600	900
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1— 600	Al. Ch.		2300	720
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1— 75	G.E.	TS-7356	220	600

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2— 80 HP 490 rpm. West. type 76-A
1— 50 HP 500 rpm. Cr. Wh. type SM
2— 35 HP 550 rpm. West. type 49D
2— 32 HP 450 rpm. G.E. type 801
2— 28 HP 385 rpm. West. type 904
1— 25 HP 600 rpm. West. type MT
1— 15 HP 650 rpm. Westg. type RL
1— 10 HP 750 rpm. Westg. type MT
1—7½ HP 725 rpm. West. type L-63-A
1—3½ HP 1200 rpm. Westg. type L

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	Tons	Make	Span	Current
(1)	8	Toledo	51'6"	230-VDC.
(1)	10	Chesapeake	59'0"	230-VDC.
(1)	10	Champion	86'0"	440-VAC.
(1)	10/5	P & H	80'0"	230-VDC.
(1)	15	Shaw	106'8"	230-VDC.
(1)	30/5	Cleveland	58'6"	230-VDC.
(1)	125/25	Morgan	100'0"	230-VDC.
(1)	175/25	Morgan	54'0"	230-VDC.

(Above Two Cranes Four Girder Ladle Cranes)

230-VDC. Crane & Mill Motors

	H.P.	Make	Type	RPM
(6)	3	G. E.	C.O.-1803	750
(3)	5	G. E.	MD-101	800
(1)	6	G. E.	C.O.-1805	1150
(1)	7½	G. E.	C.O.-1804	720
(1)	7½	Westghse	K-4	900
(1)	7/10	G. E.	MD-102(back axle)	1025/800
(1)	9	G. E.	MD-102(back axle) (C.P.)	975
(1)	10	G. E.	C.O.1805	925
(1)	12/16	G. E.	M.D.-103	875/725
(1)	12/16	G. E.	M.D.-103(back axle)	875/725
(5)	14/19	C. W.	B.W. (back axle)	675/560
(5)	14/19	C. W.	B.W.	675/560
(1)	15	Westghse	H.K.-5	700
(5)	15	Westghse	K-5	630
(4)	15	Westghse	MCA-30	600
(1)	20	Westghse	H.K.-6	650
(1)	25	G. E.	COM-1828(C.P.)	850
(2)	27½	Westghse	K-7	535
(1)	30/45	G. E.	MD-104½ (C.P.)	625/500
(1)	30/45	C. W.	Size D.W.	620/520
(2)	40	Westghse	MCA-50	440
(1)	40	Westghse	MCB-50	440
(5)	45	G. E.	MD-104½	500
(1)	50	G. E.	MD-105 (C.P.)	470
(1)	50	G. E.	CO-1829(C.P.)	650
(1)	50	G. E.	MD-105(back axle)	475
(1)	50	Westghse	K-10	740
(1)	52	Westghse	K-10(back axle)	740
(2)	54/80	C. W.	Size F.W.	575/480
(5)	65	Westghse	MCB-60	425
(2)	65	G. E.	C.O.-1811(C.P.)	800
(2)	85	G. E.	M.D.-106	460
(2)	85/110	G. E.	M.D.-107	500/450
(3)	90	Westghse	MCB-70	400
(2)	90	Westghse	MCA-70(C.P.)	475

(All Above Series Wound Except Where C.P. "Compound Wound")

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(1)—260-K.W., 250-275-VDC. Allis Chalmers, factory built set with 288-HP. Syn. motor, 80% P.F., 440/3/60-cy. A.C. & D.C. panel, O.C.B. & starting equipment.

Variable Speed Motors 230-VDC.

	H.P.	Make	Type		RPM
(1)	3	G. E.	RLC-111	(SH.)	500/1500
(1)	3	G. E.	CR-3		500/1500
(1)	3(Drip-proof B.B.)	Reliance	14T	(SH.)	1200/3600
(1)	5	G. E.	RLC-115	(SH.)	250/1000
(1)	5	G. E.	RF-9	(SH.)	450/1350
(1)	5	Westghse	SK-33	(SH.)	1150/1650
(1)	6	G. E.	RF-3	(SH.)	450/1350
(1)	7½	Reliance	78T	(SH.)	300/1200
(1)	7½	G. E.	RF-10A	(SH.)	450/1350
(1)	7½	Westghse	SK-70		600/1800
(1)	7½	Westghse	SK-70		600/1000
(1)	7½	Westghse	SK-60L	(C.P.)	650/1300
(1)	7½	Westghse	SK		850/1700
(1)	8	Westghse	SK-100L	(SH.)	300/1200
(1)	8½	G. E.	RF-9	(SH.)	600/1800
(1)	10(115-V.)	Elec. Dy.	7½-S		250/1000
(1)	10	Westghse	SK-80L		800/1500
(1)	10	G. E.	CD		850/1250
(1)	10/15(new)	Allis-Ch.	ER-100	(SH.)	575/1725
(1)	10	Westghse	SK		600/1500
(1)	12	Westghse	SK		600/900
(1)	15	Westghse	SK	(SH.)	400/1600
(1)	15	Westghse	SK-100L		450/1500
(1)	15	Reliance	131-T	(SH.)	500/1500
(1)	19	Westghse	SK-100L	(C.P.)	600/1200
(2)	20	G. E.	RLC		600/1200
(1)	20	G. E.	RLC-702		250/1000
(1)	20	Triumph	Comp.		250/1000
(1)	20	Westghse	SK		650/2200
(1)	25	G. E.	CD-128Y	(SH.)	200/800
(1)	25	G. E.	RF-13	(SH.)	400/1200
(1)	25	Reliance	F-3	(C.P.	500/1500
(1)	30	Westghse	SK-163	(SH.)	400/1200
(1)	35	Westghse	SK-160	(C.P.)	500/750
(1)	45	Reliance	310-T	(SH.)	500/1500
(1)	50/60	G. E.	RLC-205	(SH.)	400/1200

(2)—150-HP. Electro Dynamic Variable Speed, 3-bearing, Frame 75-S, Comp. Interpole, 250/500-RPM., 2-hrs. 185-HP., with Monitor Control Panels, built in Resistance. Auto 4-Step acceleration, non reversing, P.B. control.

Slip Ring (Constant Duty)

220/440-V., 3-PH., 60-CY.

	HP.	Make	Type		RPM
(1)	3	G. E.	M.Q.-1801	(2-PH)	1080
(2)	7½	G. E.	MT-201	(550-V)	1200
(1)	10	G. E.	I.Q.	(2-PH)	1120
(1)	20	Westghse	C.W.		900
(1)	38	G. E.	I		1200
(1)	100	G. E.	I.M.		860
(1)	200	Westghse	C.W.		514
(1)	250	Westghse	C.W.		435
(1)	500	Allis-Ch.	Any		585
(1)	500	Westghse	C.W.-2200-V.		360
(1)	600	G. E.	MT412X	(2200-V)	719
(1)	750	G. E.	MT414V	(2200-V)	709

(Above 2 motors have G.E. control CR-2016)

(1)	1200	Allis-Ch.	ANY	(6600-V) 300

(Primary & Secondary Liquid Slip Control)

(1)	1500	G. E.	MT-(2200-V.)	273

(G. E. C. R.-2016 Control)

(1)	2500	G. E.	MT-(6600-V.)	257

(With Primary & Secondary Liquid Slip Control)

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1—25-ton Harnischfeger Crane, 4 motor, 80'0" span, 5-ton aux. 220/440 vo. 3 ph. 60 cy.
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1—1-ton Shepard Hoist, geared trolley, complete with bridge motor and bridge shafting for 20-ft. span, 220 vo. 3 ph. 60 cy.
1—1½-ton Sprague, double drum, 4-parts of cable, chain-driven trolley, 230 volts D.C. mono-rail type.
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"*ANYTHING* containing IRON or STEEL"

RAILS NEW AND RELAYING
TRACK ACCESSORIES
from **5** *Warehouses*

- PROMPT SHIPMENTS
- FABRICATING FACILITIES
- TRACKAGE SPECIALISTS

EVERYTHING FROM ONE SOURCE

L. B. FOSTER COMPANY
PITTSBURGH CHICAGO
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RELAYING RAIL
TRACK ACCESSORIES
MIDWEST STEEL CORP.
Gen'l Off. CHARLESTON 21, W. VA.
Warehouses
CHARLESTON, W. VA.
KNOXVILLE, TENN. • PORTSMOUTH, VA.

New RAILS Relayers

All sizes and weights. Also frogs, switches, spikes, bolts, tie plates, contractors' and mine equipment carried in stock.

480 Lexington Ave., New York, N. Y. **M. K. FRANK** **Reno, Nevada** **Havana, Cuba** **Park Bldg. Pittsburgh, Pa.** **Carnegie, Pa.**

New and Used
RAIL & INDUSTRIAL EQUIPMENT CO.
30 Church St., New York 7, N. Y.
Telephone BArclay 7-9840

WANTED

The Union Gas Company of Canada, Limited, Chatham, Ontario, Canada, requires steel pipe for gas lines, approximately 5 miles of 16" O.D. P.E., working pressure 350#; 63 miles of 12¾" O.D. P.E., working pressure 600#. Advise anything approximating these, quoting price per foot, F.O.B. cars at named loading point, and delivery, subject to inspection.

WANTED
STEEL BUILDING OR STEEL TRUSSES
For a Building Approximately 150' x 250' Clear Span.
Also a building approximately 60 x 210 or longer with overhead crane.
BARON STEEL COMPANY
4075 Detroit Ave., Toledo, Ohio

WANTED
Steel Buildings all sizes. With or without runways.
IRON & STEEL PRODUCTS, INC.
13496 S. Brainard Ave., Chicago 33, Illinois
"ANYTHING containing IRON or STEEL"

WANTED TO BUY

22 Gauge Sheet Steel
Can use 20 or 24 Gauge
Hot or Cold Rolled
Wire

THE BUCKEYE INCUBATOR CO.
Springfield, Ohio
Or Phone 9781

For export we can use continually ex warehouse or otherwise from five to 1000 tons Black or Galvanized Sheets from 20 to 28 Gauge. From 20" by 20" in size and up, bundled FAS Closest Seaport. Wire, write or phone.

Inter American Equipment Co.
206 Board of Trade Bldg., New Orleans, La.
Mag. 0422

WANTED
Ingersoll slab mill, movable rail, 6 or 7 ft. between housing, 20 ft. to 22 ft. table, 4 heads.
Open side planer 84 in. by 20 ft.
ADDRESS BOX No. 7835-A
The Iron Age, 10 S. LaSalle St., Chicago 3

WANTED
Gang slitter suitable for slitting steel coils —preferably with take-up reel or recoiler. Can also use additional take-up reel or recoiler.
EDWARD LANE
Box 92, College Park Station
Detroit 21, Michigan

WANTED TO BUY

Four 400 to 500 tons, 24 or 26 gauge Hot or Cold Rolled Blanks, shearings or coils 6" x 12" or multiples. Clean stock, no rust. Wire or telephone Franklin 2311.

S. G. ADAMS CO.
2947 Delmar Blvd. St. Louis, Mo.

WANTED
Press Brake, 10' or larger for light sheet metal
12 ft. Squaring Shear for #18 Gauge
THE CINCINNATI SHEET METAL & ROOFING CO.
226 E. Front, Cincinnati, Ohio

W A N T E D
YOUR Inquiries and offerings
"ANYTHING containing IRON or STEEL"
MORE FOR YOUR DOLLAR
IRON & STEEL PRODUCTS, INC.
41 Years' Experience
13496 S. Brainard Ave., Chicago 33, Illinois
BUYERS SELLERS TRADERS

WANTED — IMMEDIATELY
Power Press Brake, 3/16" to 3/8", 10 to 12 ft. long
Power Press Brake, 10 gauge by 5 ft. long
Power Squaring Shear, 3/16" to 3/8", 10 to 12' long
No. 3 or 4 Kling Universal Iron Worker
Prefer equipment built since 1940 and equipped 220-440, 3-phase, 60-cycle motors.
Address: **W. S. ROCKWELL CO., Fairfield, Conn.**

WANTED
One steel building with ten-ton crane in multiples of 60 feet wide and 100 feet long or one building 120 ft. x 200 ft. with 20 ft. under the hook. We will remove.
ADDRESS BOX A-896
Care *The Iron Age*, 100 E. 42nd St., New York 17

WANTED
STEEL SHEETS

New or Used, black or galvanized. No objection to a few holes. Hot or cold rolled. State hardness of steel.
Widths—16" or wider
Lengths—96" or longer
Must not be warped

IRVINGTON FORM & TANK CORP.
Irvington, N. Y.
New York Office: 43 Cedar Street

Upsetting & Forging Machines 3" and smaller
No. 2-B American Gas Rotary Furnaces
Board Drop Hammers
Bar Shears.

DONAHUE STEEL PRODUCTS CO.
1919 W. 74TH ST., CHICAGO 36, ILL.

WANTED TO BUY

One or more 120 to 150 K. W. AJAX-WIRED Rolling Mill type Melting Furnaces for Yellow or Red Brass. Must be complete with tilting mechanism, electrical equipment, etc., and in good condition.

Also interested in buying a Reverberatory Furnace, capacity up to 50,000 pounds per day.

PIPE & TUBE PRODUCTS, INC.
EMPIRE STATE BUILDING, NEW YORK, N. Y.
PHONE: Bryant 9-2685

Air Compressors Wanted

Horizontal Water Cooled — 100 CFM or larger; also
Gasoline or Diesel Driven Portable Machines

L. W. BAUER
North Bergen, N. J.

WANTED IMMEDIATELY

100-Tons — Hot or Cold Rolled Sheets #18 to #26 Gage
100-Tons — Structural Steel Each
Channels —3" to 15"
Beams —6" to 27"
Angles —3" to 6"

IRON & STEEL PRODUCTS, INC.
41 years' experience
13496 S. Brainard Ave., Chicago 33, Illinois
"ANYTHING containing IRON or STEEL"

CRANES WANTED AT ONCE

One 4-motor O.E.T. Crane, 15/5 tons or 20/5 tons, 35 ft. lift with approximately 88 ft. 2" span for 230 v. DC service. Also one 4-motor G.E.T. Crane, 10/3 tons or 10/5 tons, 35 ft. lift for approximately 50 ft. span and 230 v. DC service.

Firth Sterling Steel Company
McKeesport, Pa.

WANTED
Three or four spindle automatic tube polishing machine with ¾" to ¼" capacity. Acme T3 model preferred.

Hamilton Manufacturing Corp.
Columbus, Indiana

WANTED

Additional readers to take advantage of the many unusual opportunities listed in

THE CLASSIFIED SECTIONS
of
THE IRON AGE

BUSINESS OPPORTUNITIES

PRODUCT WANTED

MANUFACTURING CONCERN WITH 70 YEARS' EXPERIENCE WILL BUY FULLY DEVELOPED INDUSTRIAL TYPE PRODUCT TO AUGMENT PRESENT PRODUCTION.

MUST HAVE $300,000 ANNUAL SALES POSSIBILITIES THROUGH EXISTING SALES ORGANIZATION.

MANUFACTURER HAS MEDIUM SIZED MACHINE SHOP AND GREY IRON FOUNDRY.

REPLIES STRICTLY CONFIDENTIAL

ADDRESS BOX A-886

Care *The Iron Age*, 100 E. 42nd St., New York 17

300,000 Sq. Ft. N. J., 5 miles to N. Y. C. Fireproof. High ceilings. Heavy floor load. RR Siding. Unrestricted. Deep water & dock available. 5 acres. Immediate possession. Accept corporate stock.

GROSS & GROSS

24 Commerce St., Newark Mitchell 2-3870

NEED A MANUFACTURER FOR YOUR PRODUCT?

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Whether you need parts or complete assemblies see the

CONTRACT MANUFACTURING SECTION

EMPLOYMENT EXCHANGE

EMPLOYMENT SERVICE

EXECUTIVES EXCLUSIVELY

SUPERINTENDENT DIE AND TOOL SHOP

$6,000 plus bonus. To take complete charge of rapidly growing die and tool shop in Pittsburgh area. Must be experienced in estimating jobs and supervising manufacture of the following dies: Die casting, plastic, permanent mold, forging, sheet metal blanking, and forming. Experience in manufacture of special cutting tools desirable but not necessary. Employer will pay placement fee.

LEONARD PERSONNEL SERVICES

Club Floor Suite

Hotel William Penn Pittsburgh, Pa.

SALARIED POSITIONS. $2,500 - $25,000. This thoroughly organized confidential service of 36 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details. R. W. BIXBY, INC., 274 Dun Bldg., Buffalo 2, N. Y.

HIGH GRADE MEN — Salaries $3,000 to $25,000. Since 1915 thousands of Manufacturing Executives, Engineers, Sales Managers, Comptrollers, Accountants, Sales Engineers, Purchasing Agents and other men of equal caliber have used successfully our confidential service in properly presenting their qualifications to employers. We handle all negotiations. Forward complete record for quick action. The National Business Bourse, 20 W. Jackson Blvd., Chicago 4, Ill.

HELP WANTED

FOREMAN

For well established tool shop in the Newark, N. J. area. Must have thorough understanding of tool room procedure and of principals of tool design. Also must be able to direct men. Write stating age, experience and rate desired.

ADDRESS BOX A-860

Care *The Iron Age*, 100 E. 42nd St., New York 17

CHEMICAL ENGINEER

Chemical engineer with detinning experience to supervise detinning plant. Reply by letter, giving full information about experience and qualifications to

BOX A-870

Care *The Iron Age*, 100 E. 42nd St., New York 17

PLANT ENGINEER Graduate Mechanical Engineer for position of Plant Engineer in firm employing approximately 800 men. Plant operates machine shop and foundry. Give full details as to age, education and experience. Address Box A-884, care *The Iron Age*, 100 E. 42nd St. New York 17.

ELECTRIC STEEL FOUNDRY — Long established Los Angeles area Electric Steel Foundry has openings for experienced Department Supervisors. State experience and salary expected in first letter. Address Box A-856, care *The Iron Age*, 100 E. 42nd St., New York 17.

WANTED—PURCHASING AGENT, technical knowledge desirable—heavy industry. Give complete information—age, experience, references in first letter. Address Box A-882, care *The Iron Age*, 100 E. 42nd St., New York 17.

HELP WANTED

Consolidated Steel Corporation
Los Angeles

NEEDS

DESIGN ENGINEERS
DRAFTSMAN-DETAILERS
DRAFTSMAN-CHECKERS
AND
ESTIMATORS-LABOR COSTS

Experienced in Structural Steel Fabrication of Buildings, Bridges, Etc.

TOP PAY PERMANENT

WRITE

Consolidated Steel Corporation

Personnel Department

P. O. Box 6880 East Los Angeles Branch
Los Angeles 22, Calif.

WANTED

SALES MANAGER

HIGH GRADE ONLY

For large **STRUCTURAL STEEL** fabricating company. State engineering experience, education, age and references first letter.

ADDRESS BOX A-876

Care *The Iron Age*, 100 E. 42nd St., New York 17

WANTED

INDUSTRIAL FURNACE DESIGNER

NATIONALLY KNOWN MANUFACTURER REQUIRES DESIGN ENGINEER WHO HAS HAD A MINIMUM OF FIVE YEARS INDUSTRIAL FURNACE DESIGN EXPERIENCE. MUST HAVE IMAGINATION AND CREATIVE ABILITY — QUALIFICATION BASED ON PATENTS ISSUED AS PART OF PREVIOUS EXPERIENCE. PERMANENT POSITION. GIVE FULL DETAILS IN LETTER. INTERVIEWS WILL BE ARRANGED IN NEW YORK, CLEVELAND, AND CHICAGO.

ADDRESS BOX A-881

Care *The Iron Age*, 100 E. 42nd St., New York 17

CHIEF ACCOUNTANT—We desire to obtain services of Cost Accountant and Auditor experienced on American steel plant costs and accounting for service with large integrated iron and steel concern in the Far East. Living conditions are excellent. Compensation will be adequate and commensurate with ability of individual. Give full information as to experience, age, salary expected, etc. All replies will be considered confidential. Address Box A-861, care *The Iron Age*, 100 E. 42nd St., New York 17.

FORGE SHOP GENERAL FOREMAN Experienced man about 40 years of age to take complete charge of small drop forge shop and die room. Must have thorough knowledge of die design and modern production practices on board hammers producing ferrous-alloy and non-ferrous forgings. Plant located in the east. Reply stating age, educational background and previous experience. Address Box A-869, care *The Iron Age*, 100 E. 42nd St., New York 17.

SALES ENGINEER WANTED: We are interested in securing the services of a good, reliable man for the sale of metals and alloys, principally to the major steel companies, but will only consider a man of experience and good record. Address Box 636, Niagara Falls, New York.

EMPLOYMENT EXCHANGE

HELP WANTED

TOOL DESIGNERS

Should have experience designing Jigs, Fixtures, Stamping Dies, Plastic Molds, Gages, Cutting Tools, etc., on small precision parts. Must be experienced in one or more of the above classifications. Large well established electrical appliance manufacturer located in N. E. Ohio. Living conditions good in small town or nearby medium sized city. If qualified, address replies to

BOX A-880
Care *The Iron Age*, 100 E. 42nd St., New York 17

FOUNDRY ENGINEER—Must be experienced in layout, foundry design, time and motion study, incentive systems and malleable iron operations. Experience with duplexing not prerequisite, but helpful. In replying please send full information: education, experience, salary expected. All correspondence will be held in strict confidence. Our employees know of this advertisement. Address Box A-887, care *The Iron Age*, 100 E. 42nd St., New York 17.

PLANT MANAGER—To take full charge of plant employing 150 people in small midwest town producing small pumps. Must have precision manufacturing experience and first hand knowledge of modern machine tools and methods plus administrative ability. Opportunity for unusual earnings to qualified man. Include full details of past experience. Replies held confidential if so requested. Address Box D-274, care *The Iron Age*, 1134 Otis Bldg., Chicago 3, Ill.

Man with sheet metal experience to do designing, drafting and estimating for middle west sheet metal job shop doing industrial work only. Excellent opportunity, permanent position. Address Box A-888, care *The Iron Age*, 100 E. 42nd St., New York 17.

REPRESENTATIVES WANTED

DISTRIBUTOR or FACTORY REPRESENTATIVE

To represent midwest manufacturer of quality blast cleaning and surface peening,

STEEL SHOT AND GRIT

for use in foundries, drop forge, heat treat and misc. metal industries. No objection to other lines. Field co-operation and national advertising. Substantial commissions. Write for information.

ADDRESS BOX A-891
Care *The Iron Age*, 100 E. 42nd St., New York 17

ACCOUNTS WANTED

DISTRIBUTOR AVAILABLE

We are expanding our line of products and desire additional items for distribution in Wisconsin. Have large warehouse and storage space on railroad siding, and good organization who can produce. Our sales last year over a million dollars.

WAGNER ENGINEERING AND SERVICE CO.
1905 South First St., Milwaukee, Wisconsin

CONSULTING ENGINEER specializing in Structural Steel Machine Design, and Stress Analysis. Want Accounts, Reasonable Rates. Address Box A-874, care *The Iron Age*, 100 E. 42nd St., New York 17.

SITUATIONS WANTED

ADVERTISING MAN AVAILABLE . . . full or part time. It will be profitable for some small manufacturer to use this complete advertising and sales service. It includes: Merchandising ideas, market research, layouts, copy, art, engraving and production. For new and better broadsides, dealer helps, point of sale displays, packaging, folders, and house organs . . . Address Box A-895, care *The Iron Age*, 100 E. 42nd St., New York 17 .

PLANT METALLURGIST, experienced in ferrous and non-ferrous metallurgy. Supervisor of laboratory and melting. Precision castings with cone and drag equipment in aluminum and copper base alloys. Address Box A-877, care *The Iron Age*, 100 E. 42nd St., New York 17.

SALES EXECUTIVE, Capable Salesman, Engineer, Organizer, 15 years as machine tool salesman, dealer, Plant manager, can get results. Address Box A-689, care *The Iron Age*, 100 E. 42nd St., New York 17.

FOUNDRY MANAGER, at present employed as Assistant Foundry Manager producing steel, stainless, heat and abrasion resisting castings. Familiar with all foundry operations, including sales and service. Address Box A-894, care *The Iron Age*, 100 E. 42nd St., New York 17.

EMPLOYMENT SERVICE RATES

HELP WANTED RATES

REPRESENTATIVE WANTED RATES

ACCOUNTS WANTED RATES

Set solid, 50 words or less..... $5.00
Each additional word 10c
All capitals, 50 words or less..... $6.50
Each additional word 13c
All capitals, leaded 50 words or less.... $7.50
Each additional word 15c

SITUATION WANTED RATES

Payable In Advance

Set solid, 25 words or less..... $1.00
Each additional word 4c
All capitals, 25 words or less..... $1.75
Each additional word 7c
All capitals, leaded, 25 words or less.. $2.50
Each additional word 10c

Count Seven Words for Keyed Address

DISPLAY RATES ON REQUEST

Do not send cash through the mail. Use money order or check. Do not send original letters of recommendation in reply to advertisements—Copies will serve the purpose. Replies forwarded without charge.

SITUATIONS WANTED

EXECUTIVE, WIDELY EXPERIENCED IN SHEET METAL AND STEEL FABRICATION, MACHINING, WELDED ASSEMBLIES, AND FINISHES INCLUDING GALVANIZING AND PORCELAIN ENAMELING. AVAILABLE FOR POSITION AS PLANT MANAGER OR ASSISTANT. PREFER EASTERN OR SOUTHERN LOCATION. ADDRESS BOX A-885, CARE *THE IRON AGE*, 100 E. 42ND ST., NEW YORK 17.

EXECUTIVE ENGINEER—M. E. degree, professional license, member of A.S.M.E. Over 20 years' experience plant management, sales maintenance and construction. Familiar with design, estimating, manufacture and installation of chemical plant and equipment and special machinery. Cost and production minded and able to lead men. Interested in connecting with small or medium size plant. Address Box A-890, care *The Iron Age*, 100 E. 42nd St., New York 17.

HARD WORKER AVAILABLE. Young man possessing a mechanical engineering background, five years of mechanical design, tools & machine shop experience, four years of naval engine room and repair ship experience, and knowledge and experience in precision casting desires association with a progressive organization located on the Pacific Coast in the sales field for precision castings, precision casting supplies; tools and/or machinery. Address Box A-897, care *The Iron Age*, 100 E. 42nd St., New York 17.

PLANT SUPERINTENDENT—Graduate engineer. Have had 10 years' concentrated experience metal fabrication, automotive parts, hardware, stainless and carbon. Thoroughly familiar press, welding, assembly, cost analysis, time study, metallurgy, inpection. Have handled 200 to 2000 men union and non-union. Strong organization builder. Address Box A-892, care *The Iron Age*, 100 E. 42nd St., New York 17.

ADVERTISING — MERCHANDISING EXECUTIVE—Change in organization discontinuing his recent functions makes available high type executive with extensive experience in steel industrial advertising, also advertising, sales promotion and merchandising in hardware, housewares and agricultural lines. Address Box A-875, care *The Iron Age*, 100 E. 42nd St., New York 17.

EXECUTIVE ENGINEER, B.S.M.E., age 35, desires permanent connection in east with company interested in reducing manufacturing costs thru a controlled cost reduction program. 12 years' varied industrial experience in methods, plant layout, maintenance, development and cost control. Address Box A-893, care *The Iron Age*, 100 E. 42nd St., New York 17.

SALES AND PURCHASING EXECUTIVE, machinery and hand tools domestically and for export. Young, energetic, versatile, with unlimited capacity for detail, and unusual ability for personal contact work. Would make ideal assistant to busy president. Prefer New York headquarters. $8,500. Address Box A-831, care *The Iron Age*, 100 E. 42nd St., New York 17.

METALLURGICAL ENGINEER over 25 years' executive experience ferrous, non-ferrous jobbing, centrifugal lost wax precision foundries. Desires connection with progressive manufacturer. Address Box A-864, care *The Iron Age*, 100 E. 42nd St., New York 17..

MANUFACTURING EXECUTIVE: long experience in precision machine shops, stampings, foundry. Capable engineer, master mechanic, cost expert: can deliver results you want rapidly, harmoniously with ordinary people. Seek key position moderate size plant. Age 46, Protestant. Address: D-273, *The Iron Age*, 1134 Otis Bldg., Chicago.

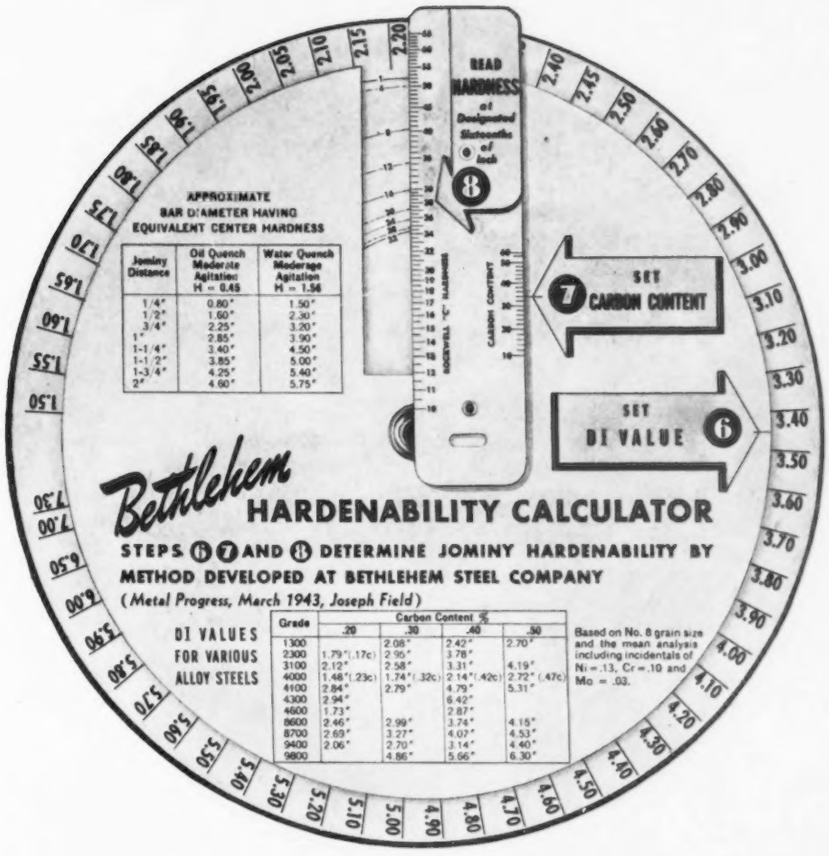
SUPERINTENDENT, Press Metal Stampings, twenty years' experience, in Production, Labor and Cost Control, with wide knowledge of light and heavy Stampings including Auto Body stampings. Address Box A-832, care *The Iron Age*, 100 E. 42nd St., New York 17.

METALLURGICAL ENGINEER — B.S., M.I.T., ex-naval officer, 3 years' experience in research and development work, interested in sales or production, preferably east coast. Address Box A-889, care *The Iron Age*, 100 E .42nd St., New York 17.

ADVERTISERS IN THIS ISSUE

ADVERTISERS IN THIS ISSUE

CLASSIFIED SECTION



A HARDENABILITY CALCULATOR

...that's almost human

Better than human in many respects, for it figures the answers with almost uncanny speed and accuracy. You'll find that it makes a minute do the work of ten.

This convenient, durable calculator is based on an earlier computer devised by Bethlehem metallurgists to save their time in the hundreds of hardenability calculations they have to make every day. The present calculator is similar in principle to the original one, but with refinements and improvements in detail. It facilitates the calculation of Jominy hardenability from chemical composition and grain size; or, in reverse, the chemistry essential to meet a desired hardness.

Here's one example: Suppose you're to work with a bar 2 ¼ inches in diameter. You know that .40 carbon steel is essential and that a moderately agitated oil quench is indicated. You are shooting for a minimum Rockwell C 41 at the center of the bar. What analysis or analyses will do the job?

Using the calculator, you set a slide, turn a dial, take a reading—then refer to the tables for DI values. Your answer: Grade 4140, 4340, 8740, or 9840.

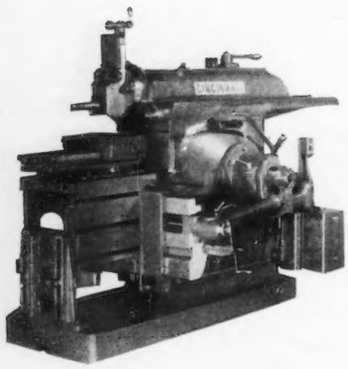
As easy as that. And it's only one of the ways you can use this ingenious calculator. Once you've tried it, you'll always want it at hand for reference purposes.

FREE! If you are a metallurgist whose work involves Jominy calculations, you can secure one of these time-saving, durable calculators, free of charge. Simply write on your company letterhead to Bethlehem Steel Company, Bethlehem, Pennsylvania, giving your name, address, and position.

BETHLEHEM STEEL

THEY LIKE IT TOUGH

Courtesy of
Federal Engineering Co.,
Detroit, Mich.



In the large tool and die shops of industry . . . day in and day out . . . standards are tough. The die steels are tough, and performance demands are tough.

Powerful, sturdy Cincinnati Shapers are found in these shops, for they are dependable on the tough job.

Write for Catalog N-3 for complete details on Cincinnati Shapers.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

ELECTRIC BRAZING FURNACES PROVED BY 40 YEARS

Every G-E Furnace Brings You These "Plus-dividends" of Leadership—

★ **Performance-proved Construction**

★ **Technical Assistance**

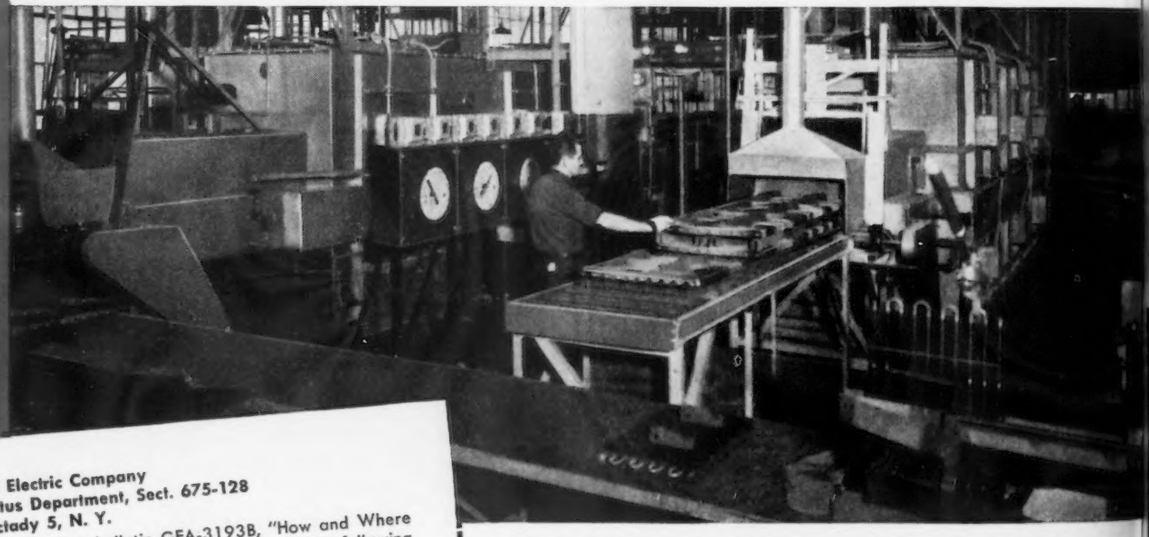
★ **Nationwide Field Service**

Pioneer and leader in electric furnace brazing since 1906, General Electric is well prepared to fulfill your furnace needs with performance-proved equipments—with designs steadily improved by forty years of experience, research, and development. G-E "know-how" is available to assist in product and process improvements by suggesting proper techniques, both before and after you buy your brazing furnace. And an expert field engineering organization is maintained in major cities throughout the country to speed installations, help solve operating problems, and to be readily available for servicing of equipment.

Better Products by Brazing—Electric furnace brazing merits consideration as both a cost reducer and as a likely means of *improving your product.* Here are some of the reasons:

1. Manufacturing costs may be substantially reduced by substituting the fabrication of inexpensive subassemblies (stampings, screw-machine parts, tubing) for forgings, machining, and castings.
2. The great strength of furnace-brazed joints often means increased life of subassemblies and therefore reduced service costs.
3. Gas tight joints are made possible to an unusually high degree.
4. Bright surfaces and smooth fillets (without subsequent cleaning operations) mean excellent appearance.

Furthermore, furnace brazing permits savings in time, material, weight, and space. It is adaptable to both high and low production rates, and its flexibility permits a variety of assemblies to be handled with a single equipment.



Roller-hearth furnaces, for high-quantity production, operate continuously months on end at 2050 F without shutdowns for repairs—thanks to well-supported, heavy ribbon-type heating units; large-diameter, low-stressed alloy rolls; and other conservatively designed features. Here, steel-fin refrigerator condensers, each with brazing metal (copper) preplaced at 800 joints, are brazed in a single trip through the controlled-atmosphere heating and cooling chambers of these furnaces.

General Electric Company
Apparatus Department, Sect. 675-128
Schenectady 5, N. Y.

Please send me bulletin GEA-3193B, "How and Where to Use Electric Furnace Brazing," and also the following (please check): ☐GEA-4066, Box Furnaces; ☐GEA-4071, Mesh-belt Conveyor Furnaces; ☐GEA-4072, Roller-hearth Furnaces.

Name.....

Company.....

Address.....

City.....State.....

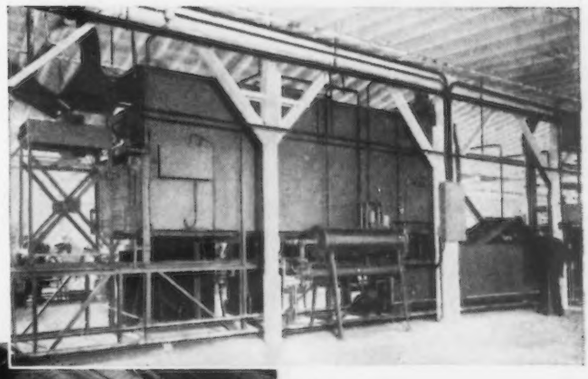
8728

FOR PRECISION HEAT-TREATING AT

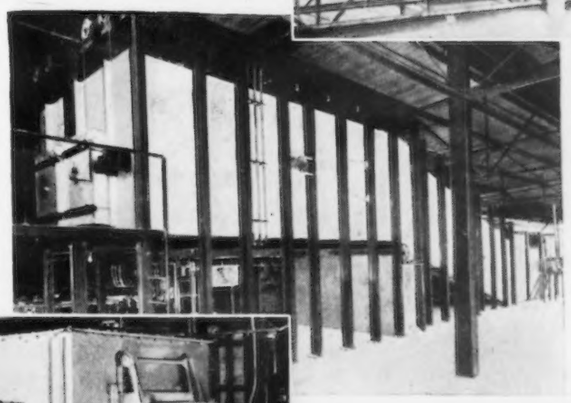
...AND IMPROVED
FURNACE BRAZING EXPERIENCE

You reap the benefits of G-E "know-how" on these heating equipments, too . . .

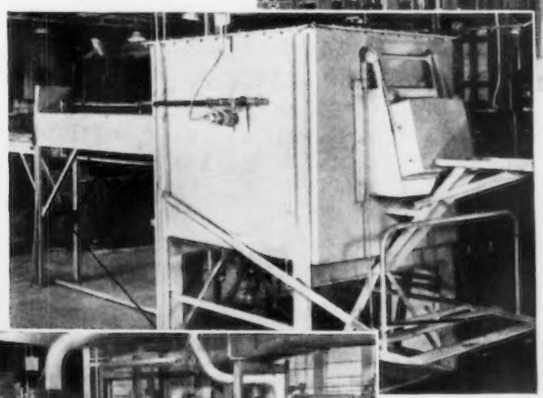
In addition to brazing furnaces, G.E. builds electric furnaces for virtually every type of heat-treating process. Here are just a few:



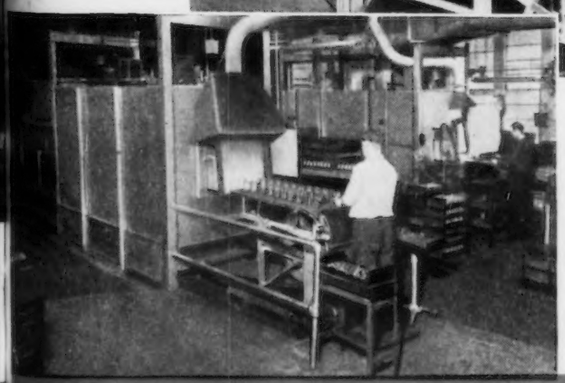
▲ **Belt-conveyor hardening furnace**—for uniform, automatic, *clean* hardening, without decarburization, of bolts, bearing races, business machine parts, and many similar products.



Porcelain-enameling furnace—This continuous-type conveyor furnace produces a durable, high-lustre finish in porcelain enameling of cast-iron and sheet-steel stove and range parts, kitchenware, signs, table tops, refrigerator liners and cabinets. ▶



Box furnace—ideal for jobbing shop or small-scale production for furnace-brazing, bright annealing, bright normalizing, scale-free hardening, and sintering powdered-metal compacts. The well-supported heating units may be nickel-chromium ribbon (2100 F max. operating temperature), silicon carbide (2500 F max.), or moly rod (2750 F max.). ◀

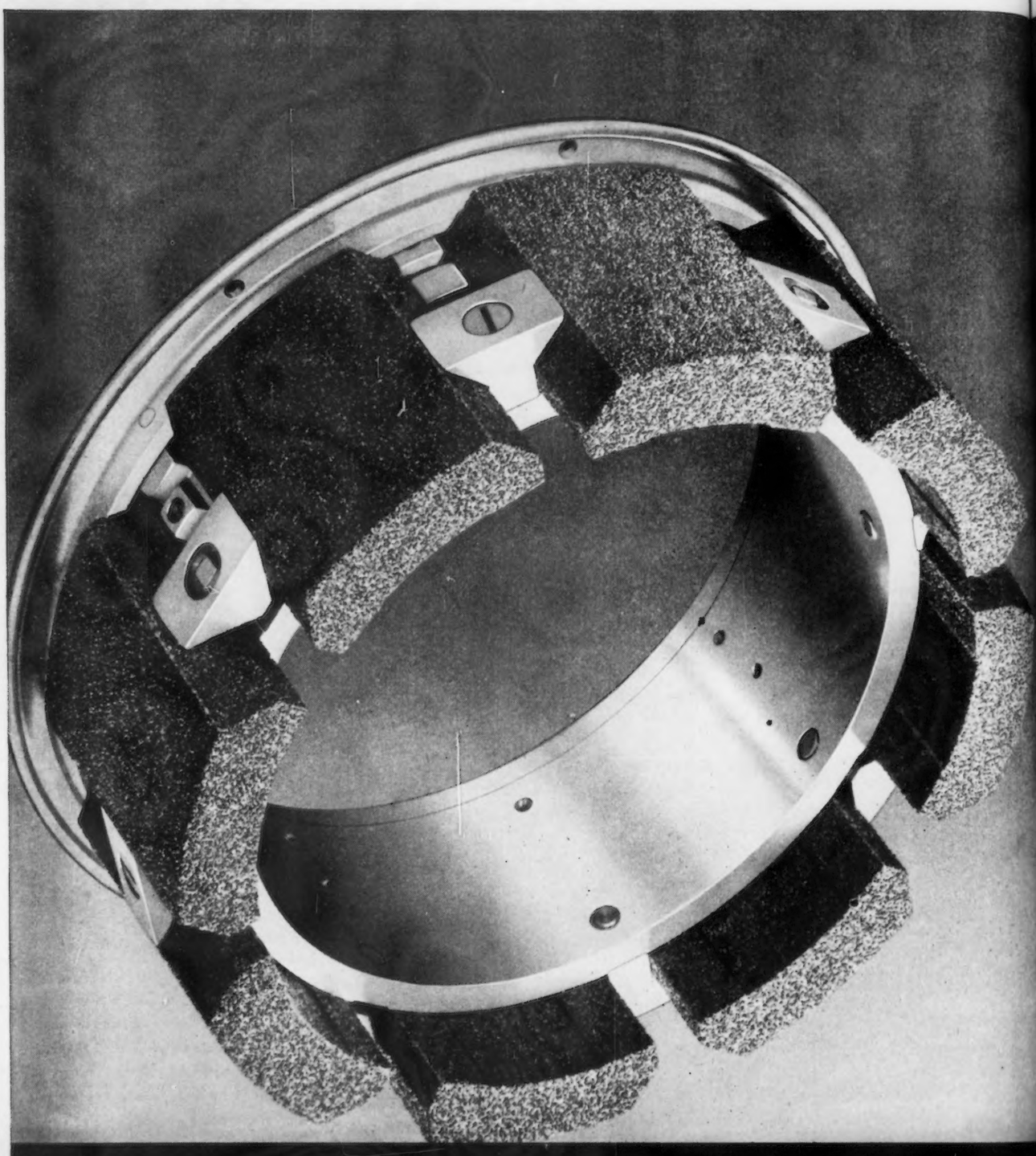


Mesh-belt conveyor furnace—A flexible, continuous-type equipment for high-quality brazing, bright-annealing, bright normalizing, and sintering. Heating *and cooling* take place within the protective atmosphere to assure clean, bright work.

General Electric has also had wide experience in the development and construction of electronic induction and dielectric heaters for a variety of applications, in addition to furnaces and small heating devices. Our heating specialists and application engineers are prepared to recommend the electric heating equipment most suitable for your process.

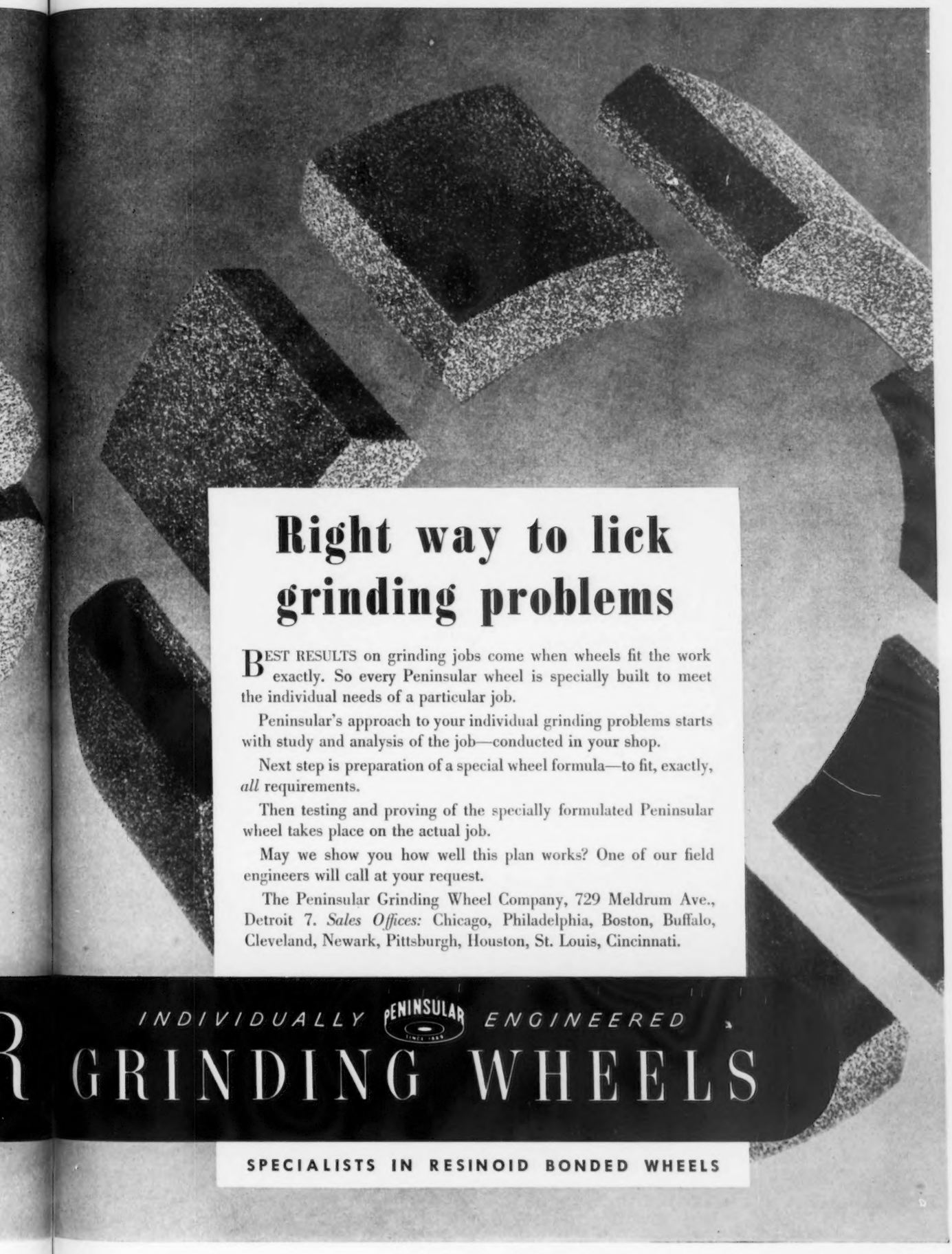
GENERAL ELECTRIC

LOWEST OVER-ALL COST . . . *USE ELECTRIC FURNACES*



PENINSULAR

SINCE 1889



Right way to lick grinding problems

BEST RESULTS on grinding jobs come when wheels fit the work exactly. So every Peninsular wheel is specially built to meet the individual needs of a particular job.

Peninsular's approach to your individual grinding problems starts with study and analysis of the job—conducted in your shop.

Next step is preparation of a special wheel formula—to fit, exactly, *all* requirements.

Then testing and proving of the specially formulated Peninsular wheel takes place on the actual job.

May we show you how well this plan works? One of our field engineers will call at your request.

The Peninsular Grinding Wheel Company, 729 Meldrum Ave., Detroit 7. *Sales Offices:* Chicago, Philadelphia, Boston, Buffalo, Cleveland, Newark, Pittsburgh, Houston, St. Louis, Cincinnati.

INDIVIDUALLY PENINSULAR ENGINEERED

GRINDING WHEELS

SPECIALISTS IN RESINOID BONDED WHEELS

is still King!"

Quoted from MATERIALS & METHODS

FOR each application there is usually one best material. It is no mere coincidence that today Steel is the odds-on favorite in virtually every field of manufacture. There are crystal-clear reasons why this is true. . . .

1 ECONOMY

Low cost has always been a fixed characteristic of Steel, not only in the price of the basic material but in the expenditure required to make it into a finished product.

2 VERSATILITY

Only Steel can be produced in such an extreme variety of alloys, forms and finishes. Its characteristics can be tailor-made to fit exactly the demands of the end use . . . high strength-weight ratio, resistance to abrasion, heat, corrosion and fatigue.

3 FABRICABILITY

No other material can be so readily cut, formed, welded, riveted, soldered, machined, stamped and finished.

4 AVAILABILITY

The persistent and far-thinking expansion of Steel's production and distribution facilities makes it today's most abundant manufacturing material.

Have you explored the possibilities of these special purpose U·S·S Steels?

U·S·S STAINLESS AND HEAT-RESISTING STEELS to assure high resistance to corrosion and heat, and to reduce weight.

U·S·S CARILLOY STEELS—Alloy steels for the special jobs of industry.

U·S·S HIGH STRENGTH STEELS to resist atmospheric corrosion and increase strength without adding weight.

U·S·S COPPER STEEL to give at least twice the atmospheric corrosion resistance of regular steel at little additional cost.

U·S·S ABRASION-RESISTING STEEL to combat wear and friction.

U·S·S HOT-ROLLED AND COLD-ROLLED STEELS to provide the basic advantages of steel, plus maximum economy in accordance with the needs of each job.

U·S·S PAINTBOND—A galvanized, Bonderized sheet that permits immediate painting and holds paint tighter.

U·S·S VITRENAMEL—Sheets designed especially for porcelain enameling.

U·S·S ELECTRICAL SHEETS for motors, generators and transformers.

LISTEN TO . . . the "Hour of Mystery" presented by United States Steel on the radio every Sunday evening. Consult your local newspaper for time and station.

USS STEEL — UNITED STATES STEEL

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

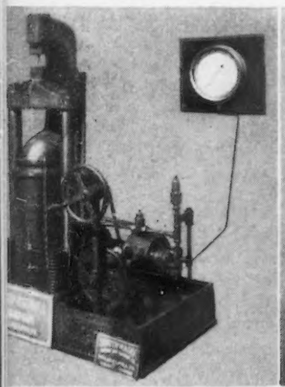
Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
United States Steel Supply Company, Chicago, *Warehouse Distributors*
United States Steel Export Company, New York

UNITED STATES STEEL

A SHORT HISTORY IN PICTURES

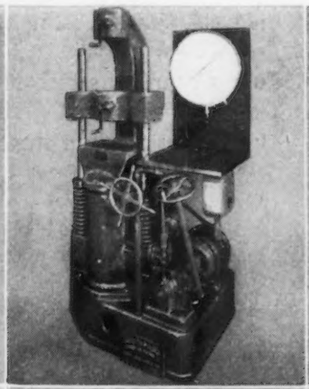
1926

The first 60,000-lb. Southwark-Emery testing machine, embraced the essential elements used today.



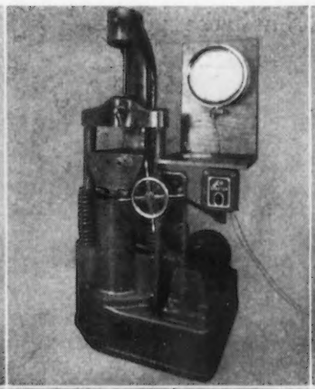
1927

Initial load springs relocated, compression space added.



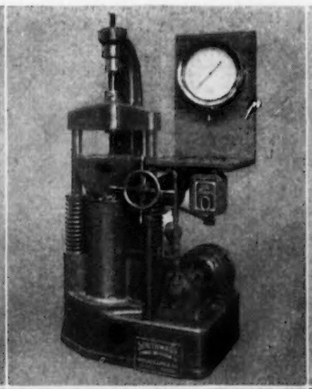
1928

Pinion operated wedge grips introduced.



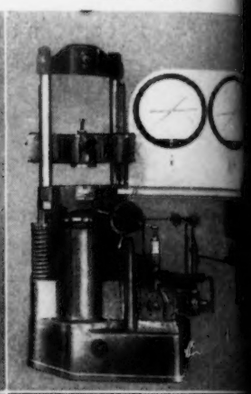
1929

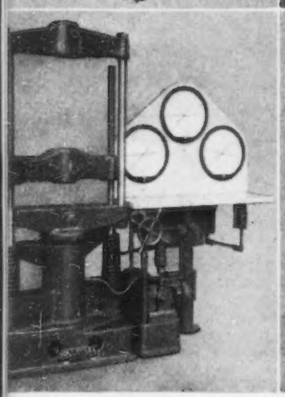
Dual loading control, 16-in. dial and adjustable crosshead appear.



1930

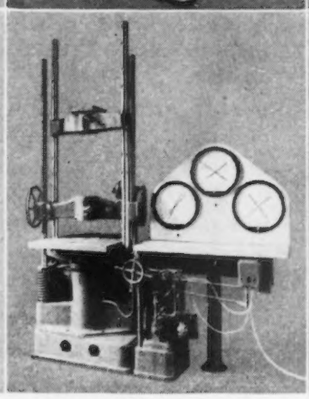
Gooseneck disappears, 2-di steel panel and maximum hand dials adopted.





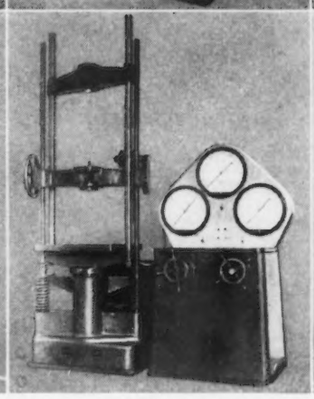
1931

Three dials become standard. Lamping unit separately mounted, column clearance widened.



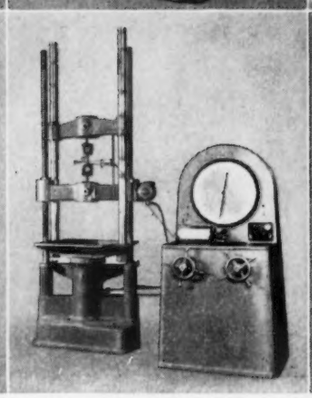
1932

Adjustable top platen, motor-driven crosshead and 30" x 30" work table.



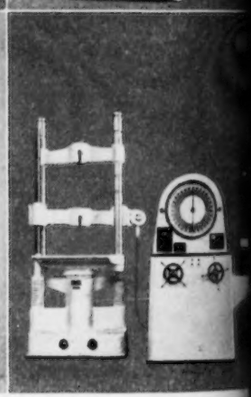
1933

"Enclosed plumbing" and "finish improvements" added. Metallurgical improvements in dial.



1936

Introducing Tate-Emery null-method double range indicator and important performance improvements.

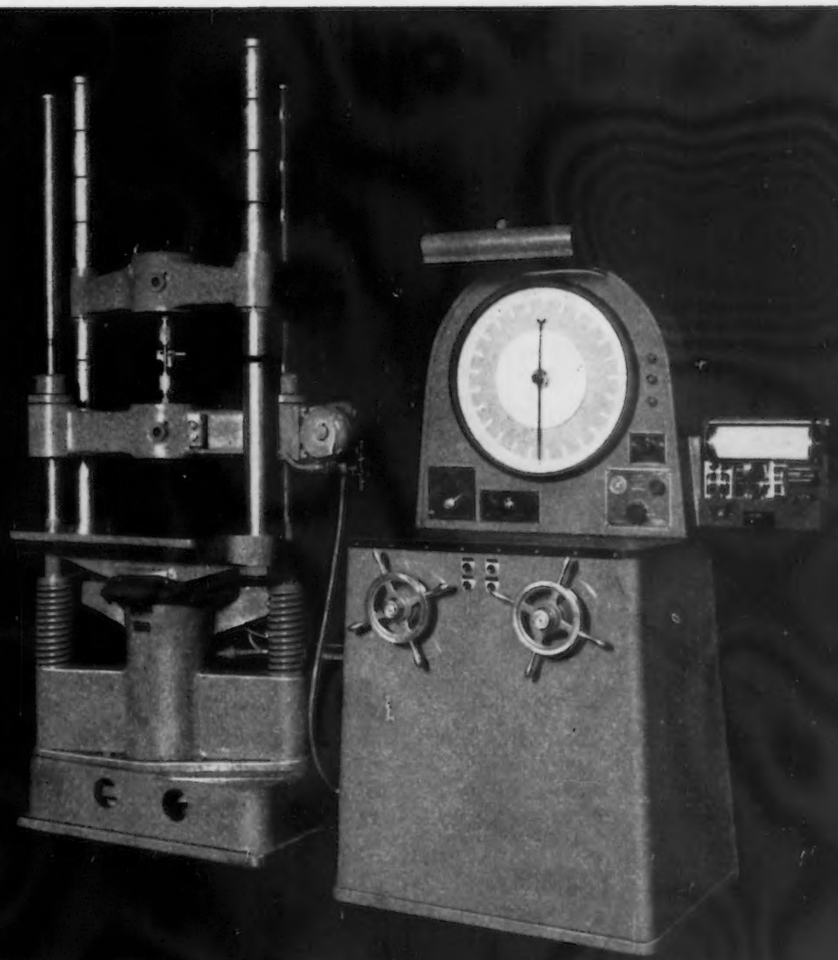


1940

Standardized design. Further improvement in dial indicator; three ranges and direct drive to recorder.

20 YEARS' DEVELOPMENT IN SOUTHWARK-EMERY

Testing-Machines



today

Design for volume production including backlash eliminators, fluorescent light on dial, "Microformer" recorder and four ranges on dial with auxiliary range extender for very low ranges.

BLW THE BALDWIN GROUP

The Baldwin Locomotive Works, Philadelphia 42, Pa., U.S.A. Offices: Philadelphia, New York, Chicago, St. Louis, Washington, Boston, San Francisco, Birmingham, Houston, Cleveland, Detroit, Pittsburgh, Norfolk.

BALDWIN

SOUTHWARK

TESTING EQUIPMENT

THERE'S A NEW PLUS VALUE IN TUBING

N-A-X HIGH-TENSILE steel has now been "put to work" in the tubing field.

The high inherent properties of this low-alloy steel open the door to better values in tubular parts and products. Its strength gives designers the choice of *reducing mass* or *increasing durability* in such diversified applications as bicycle frames, porch furniture, auto seat frames, bus stanchions, garden implements and scores of others. Resistance to impact and fatigue is exceptionally high, corrosion-resistance very good.

N-A-X HIGH-TENSILE is easy to form and to weld by standard commercial processes. Weldments are unusually strong and tough, with good ductility retained in the heat-affected zones.

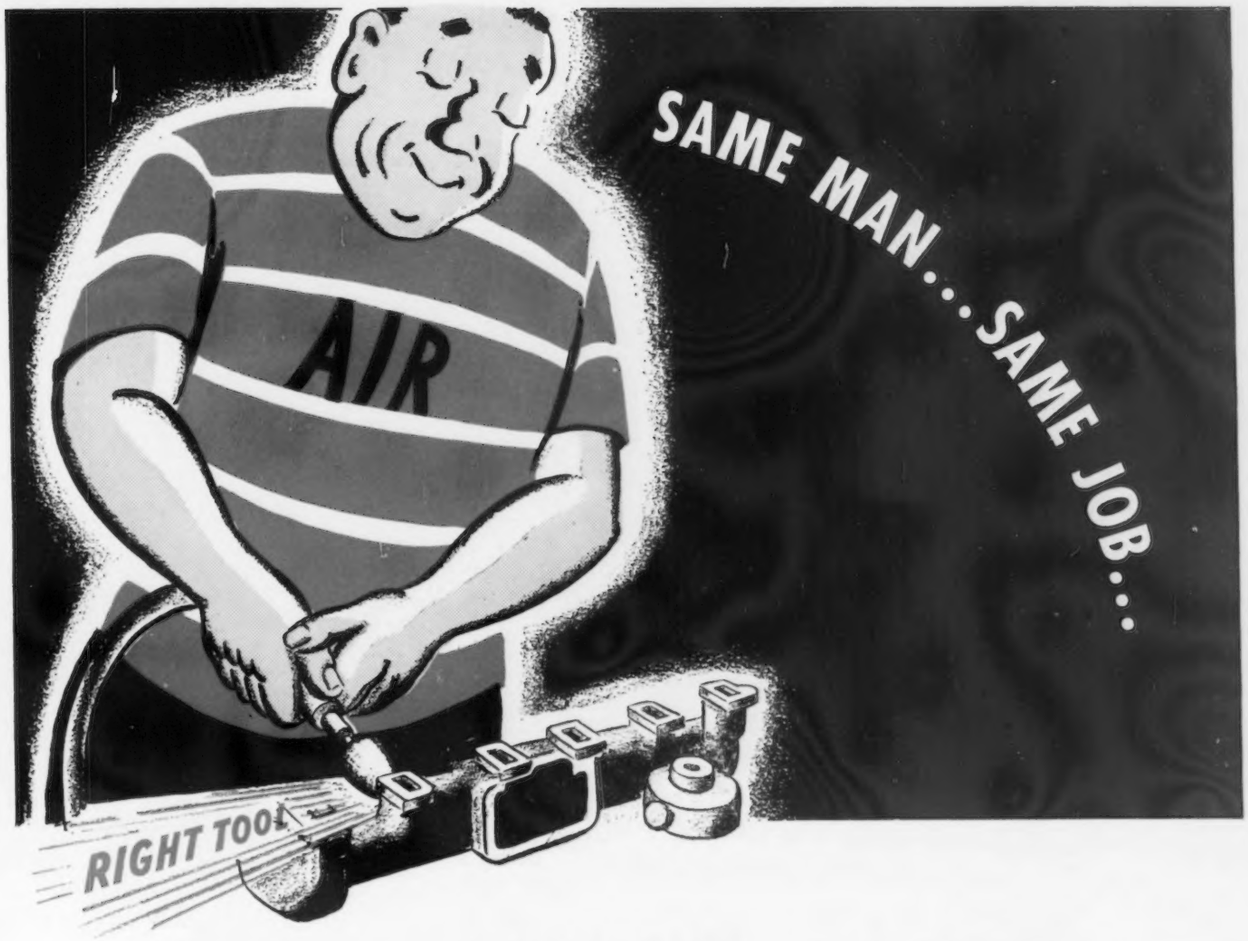
Electric-welded N-A-X HIGH-TENSILE tubing is now available through various tubing manufacturers.

GREAT STEEL FROM GREAT LAKES

GREAT LAKES STEEL CORPORATION

N-A-X ALLOY DIVISION • DETROIT 18, MICHIGAN

UNIT OF NATIONAL STEEL CORPORATION



20% LOWER COSTS

This gray iron foundry was using a small wheel grinder weighing 2¾ lbs.—17,000 R.P.M., 1¾" x 3" x 1½" elastic bonded cone wheel—to clean recesses in exhaust manifolds. They called in the Rotor Application Engineer to suggest a faster method. He recommended the Rotor M-827 midget grinder—weighing only 1⅛ lbs.—20,000 R.P.M.—same wheel as before. The change was made. Results:

Grinding costs reduced 20% because of greater production due to:

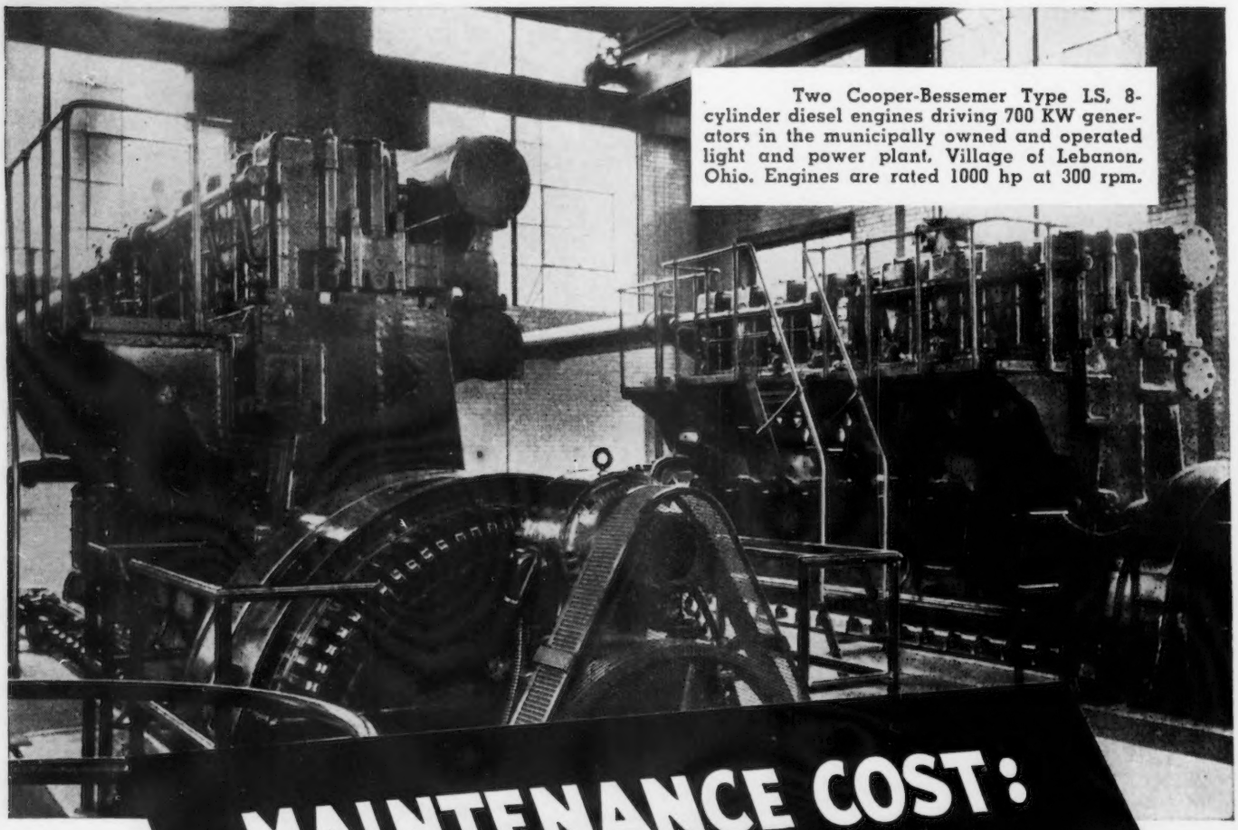
1. *Higher cutting speed* of wheel on work.
2. *Easier handling* of tool (60% lighter). Easier to reach hard-to-get-at spots.

Also: Operators were happier because work was easier.

Why not ask the Rotor Application Engineer to analyze *your* portable tool operations and see if he can discover similar ways to reduce your grinding costs?

Yours for faster grinding,
AIR O'TOOL

THE ROTOR TOOL CO.
CLEVELAND, OHIO
UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS



Two Cooper-Bessemer Type LS, 8-cylinder diesel engines driving 700 KW generators in the municipally owned and operated light and power plant, Village of Lebanon, Ohio. Engines are rated 1000 hp at 300 rpm.

MAINTENANCE COST: less than 1% per year

THESE two Cooper-Bessemer diesels powering the Lebanon, Ohio, municipal power and light plant have been in continual service since November, 1941. Maintenance cost is averaging less than 1 percent of engine cost per year. Here is a typical example of the maintenance economy demonstrated time and again in Cooper-Bessemer installations.

How about operating economy and efficiency? Mr. L. F. Wertz, Lebanon's capable plant superintendent, says, "Our fuel bill runs less than ½ cent per KW generated. Last month lube oil consumption cost us only .015 cents per KW. Bonds issued to finance our new plant are being retired much faster than originally estimated due to the earnings made possible by the efficiency of our Cooper-Bessemer Diesels." Mr. Wertz might also tell you that power is delivered at a highly competitive rate and that village-consumed power, valued at $12,000 per year, is furnished free.

Modern, long-lived Cooper-Bessemer diesels are available in sizes and types for virtually all heavy-duty requirements, stationary or mobile. Contact the nearest Cooper-Bessemer office for complete details.

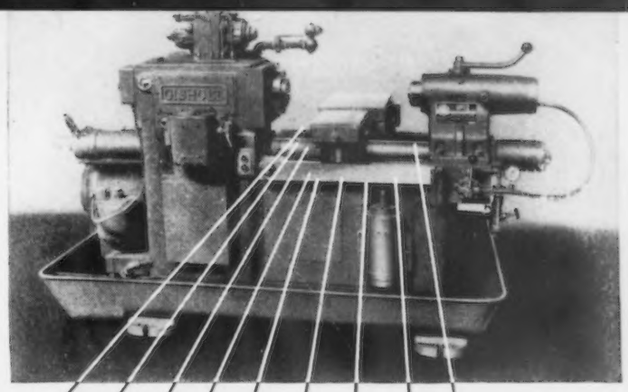
THE Cooper-Bessemer CORPORATION
Mt. Vernon, Ohio • Grove City, Pa.

New York, Washington, Gloucester, Dallas, Houston, St. Louis, Los Angeles, Seattle, San Francisco, and the Calmes Engineering Company, New Orleans, La.

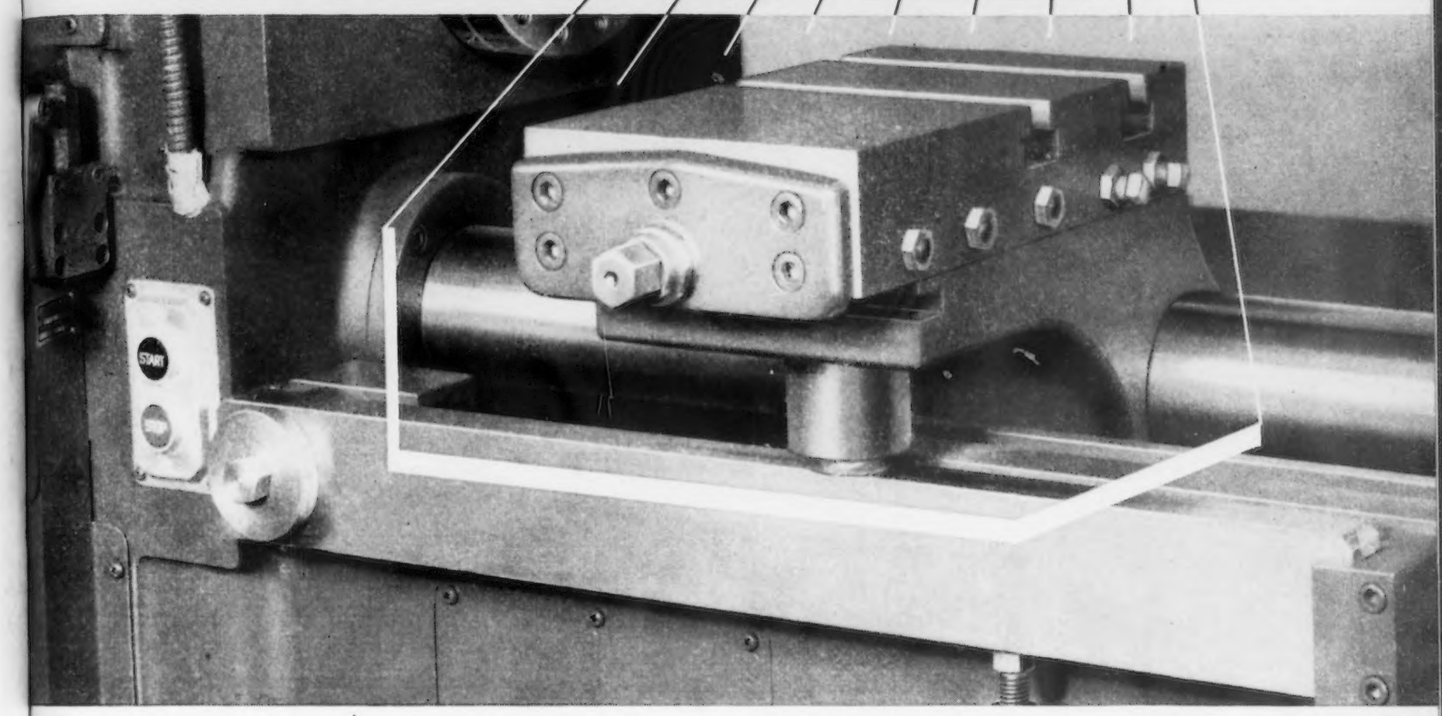
BUILDERS OF DEPENDABLE ENGINES FOR 112 YEARS

Why this front carriage is more versatile

Here's one of the many reasons why this machine can perform a number of different machining cycles and handle a remarkably wide range of work for an automatic lathe.



THE GISHOLT HYDRAULIC AUTOMATIC LATHE



The front carriage is clamped to, and receives its longitudinal motion from, a large diameter hardened steel bar along which the carriage may be clamped at any position.

The outer support for the carriage is a hardened steel beam of rectangular section, pivoted at one end and with an up-and-down motion for the other end provided by the piston-cylinder unit on the front of the machine. Raising or lowering this beam imparts a transverse movement to the carriage.

Many combinations of transverse and longitudinal motions can be made at both feed and traverse rates to meet practically every requirement. An angular in-feed attachment may be added for advancing multiple tools into the work at a controlled angle.

With a rear slide which can be placed on the bed table to feed in or out, straight or angularly, you have the combination that means faster, lower cost production on a wide variety of parts. Write for literature.

GISHOLT MACHINE COMPANY

1215 E. Washington Avenue • Madison 3, Wisconsin

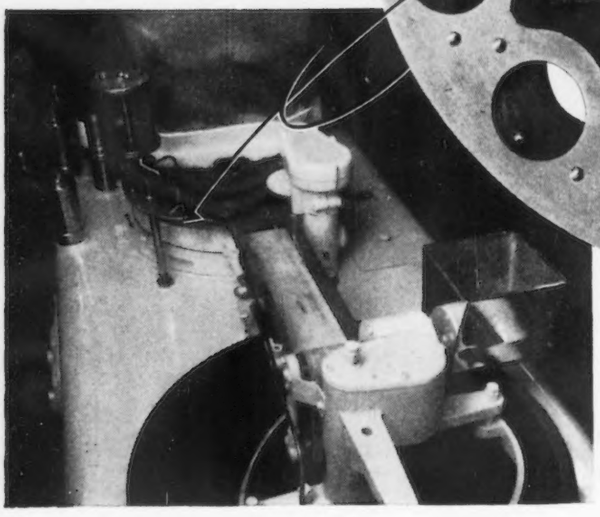
Look Ahead... Keep Ahead with Gisholt

GISHOLT

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Where superior corrosive and heat resistant qualities are "MUSTS"—

CRAMP NI-IRON for Jobs that only an ALLOY can do



Specify CRAMP ALLOY No. 265

"Ni-Resist"—Cramp Alloy No. 265—is an alloy cast iron with corrosive and heat-resistant qualities superior to those of cast iron.

Alloy No. 265 is recommended for high temperature applications, and for services where non-rusting qualities are desired. It is furnished with or without copper, as desired.

The design of modern machinery for maximum life and performance calls for a variety of service properties in materials . . . and the Cramp Line of alloys offers a wide range. For the many jobs that only an alloy can do . . . use Cramp Ni-Iron. The Baldwin Locomotive Works, Cramp Brass & Iron Foundries Division, Philadelphia 42, Pa., U. S. A. Offices: Philadelphia, New York, Chicago, St. Louis, Washington, Boston, San Francisco, Cleveland, Detroit, Pittsburgh, Houston, Birmingham, Norfolk.

WRITE FOR BULLETIN 194

This helpful catalog lists composition and properties of over 30 ferrous and non-ferrous alloys. Sent on request.

BLW THE BALDWIN GROUP

BALDWIN

CRAMP

NI-IRON CASTINGS

UNITED

HEAVY DUTY ROLL LATHES

Headstock Faceplate Directly Driven by "Cone Worm" Gears

Advantages

1. **Operation at a Steady, Uniform Speed—"CHATTERLESS"**
2. **Cone Worm Drive Permits Compact Construction**
3. **Low Head Room—Facilitates Entry of Roll**
4. **Motors Protected by Headstock**
5. **Cone Worm Drive Rated Conservatively**

The "Cone" type of worm gearing used in UNITED HEAVY-DUTY ROLL LATHES, with its hour-glass shape of worm partially "wrapping" the gear and thus bringing more teeth in constant contact, provides maximum capacity in the smallest space, and chatterless operation. This superiority has been definitely established by test and experience in UNITED 4-high mill screwdown applications.

Low head room facilitates crane handling of rolls, and compact construction permits more floor space and visibility between lathes.

All gearing up to the main cone worm faceplate drive is either single or double helical, is fully roller bearing mounted and carefully proportioned with reference to both velocity and load requirements. These fully enclosed gears and bearings are lubricated by forced oil circulation.

UNITED HEAVY-DUTY ROLL LATHES can be furnished for either "fixed" or "rotating" center.

Consult UNITED engineers for full technical data.

The World's Largest Designers and Makers of Rolls and Rolling Mill Equipment

Showing Comparative Size Between Conventional and "Cone Worm" Headstock

UNITED ENGINEERING AND FOUNDRY COMPANY

Pittsburgh, Pennsylvania

Plants at Pittsburgh · Vandergrift · New Castle · Youngstown · Canton
Subsidiary: Adamson United Company, Akron, Ohio
Affiliates: Davy and United Engineering Company, Ltd., Sheffield, England
Dominion Engineering Works., Ltd., Montreal, P. Q. Canada

NEW

Totally Enclosed

TRI/CLAD MOTORS

REG. U.S. PAT. OFF.

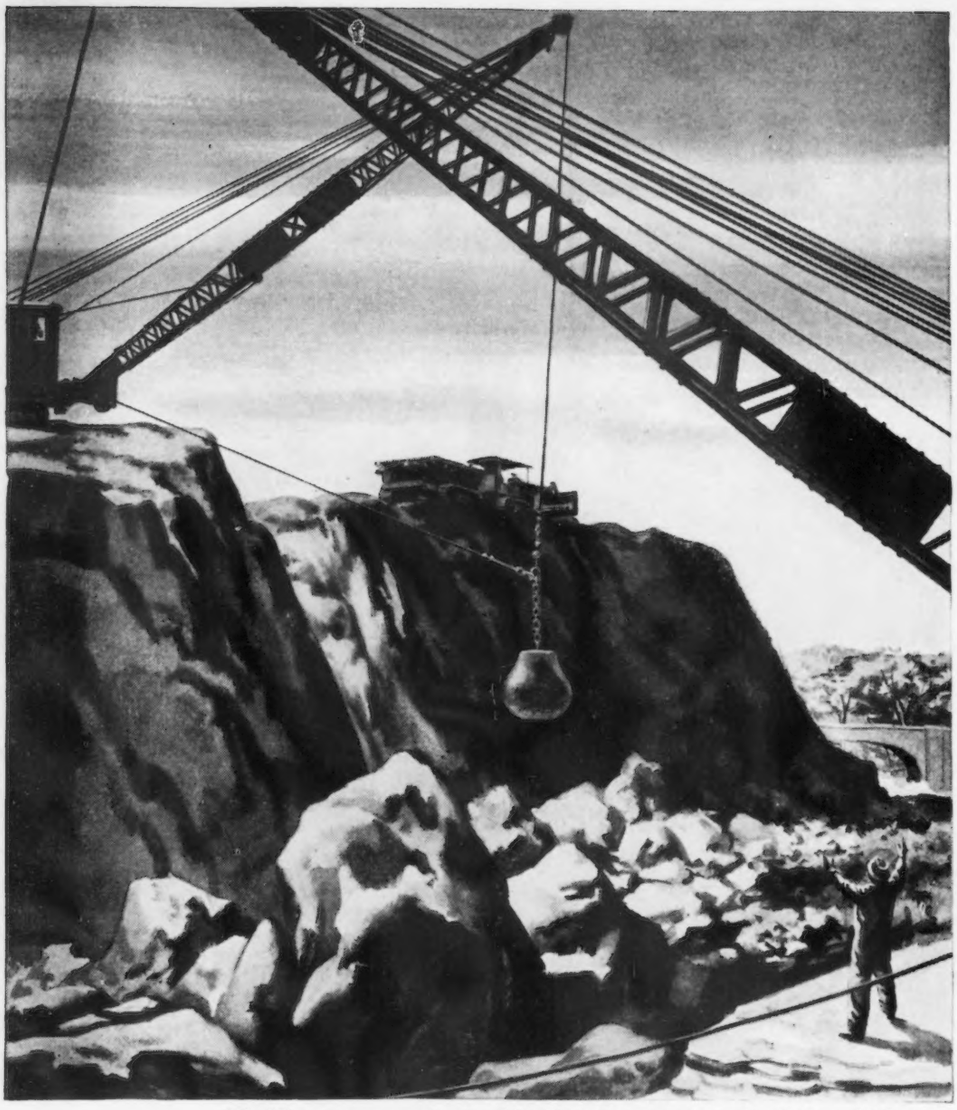
In 1940, G.E. introduced the Tri-Clad open motor—with emphasis on the feature that industry wanted most in a motor, *protection*. Since then, more Tri-Clads have gone into service than any other integral-horsepower motor.

Today, we are ready with a new line of Tri-Clad motors—*totally enclosed, fan-cooled motors*—built on Tri-Clad design principles in both standard and explosion-proof types.

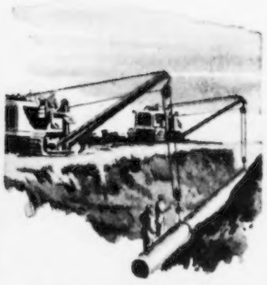
We believe that these are industry's most dependable motors. They are designed specifically for use in many adverse atmospheres—in iron dust, outdoors, in hazardous areas, and chemical atmospheres. Their scope of application is as wide as the field of industrial motor use. Safeguarded against most sources of motor damage, their longer life and lower maintenance will make them economical motors for use on almost every job. *General Electric Company, Schenectady 5, New York.*

GENERAL ELECTRIC

TRI/CLAD MOTORS



You'll see more and more jobs like these as the nation's new highway and airport building program gets under way. Skull-crackers and draglines use a lot of Preformed wire rope to get the material out.



Laying pipe lines is a fast job today with machines and Preformed wire rope. Improved methods and improved wire rope make the work easier and faster.

Do you worry when you see great weights lifted by shipyard cranes? The operators don't, for they know the Preformed wire rope will hold.

Here you see Post-War Progress in Action...

Wire Rope Makes it Possible

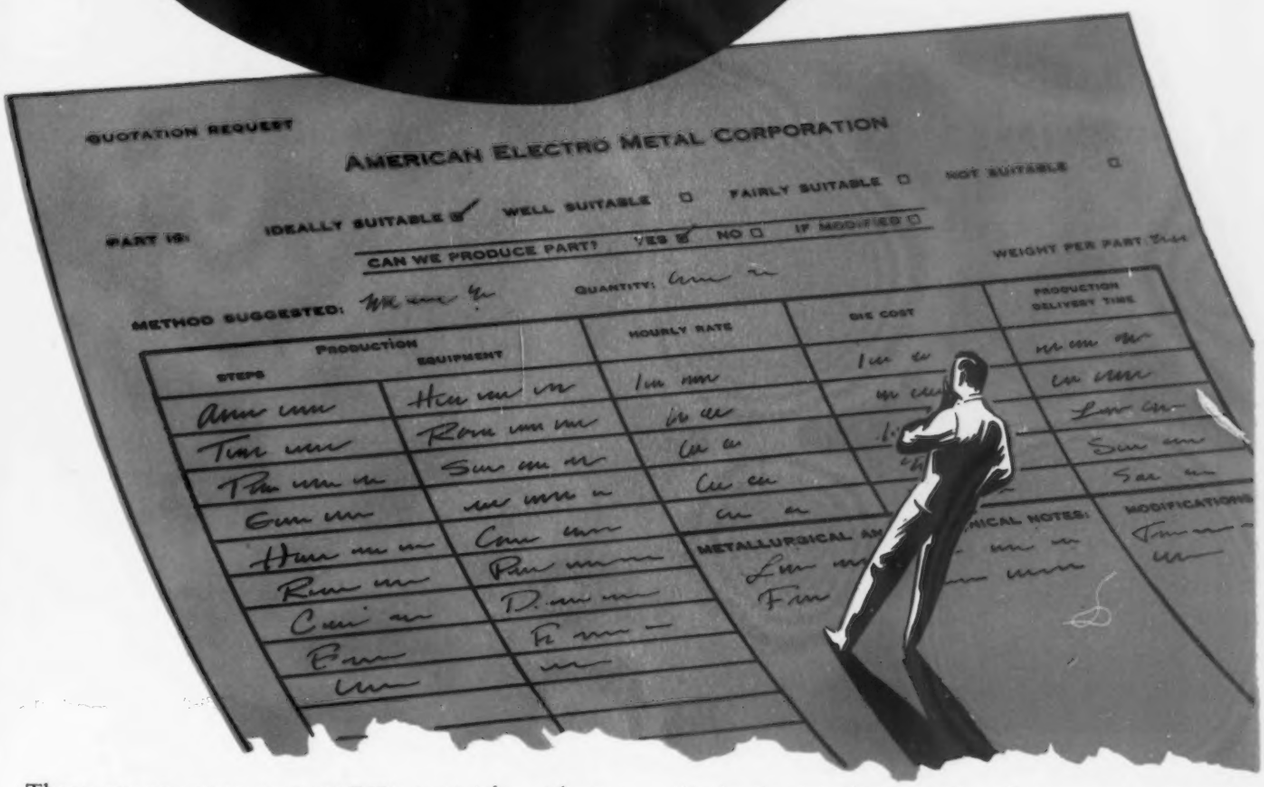
For the busy post-war days ahead, machines are rigged with Preformed wire rope. It lasts longer. It reduces time lost for replacement. It handles easier. It is safer. These operators and the front office agree Preformed is the rope for post-war progress.

ASK YOUR OWN WIRE ROPE MANUFACTURER OR DISTRIBUTOR

WIRE ROPE HANDLES EASIER - LASTS LONGER

GET THIS FREE ANALYSIS OF YOUR PARTS

. . . to see if SINTEEL POWDER METALLURGY can improve your product



There are so many new SINTEEL materials, with so many new applications, that you owe it to your product to investigate.

And we've set up a special form and procedure to help you do just that. Note its thoroughness.

There are considerations of die cost and design, of porosity (or the lack of it), of impact and tensile strength, of steel analysis and hardenability, of tolerances and moulding direction . . . all to be weighed by specialists before we can tell you whether or not (and to what degree) SINTEEL can benefit *you* and *your product.*

As developers of materials and processes . . . not just producers of pressed-and-sintered pieces . . . we can volunteer more than a simple "It'll cost you so much." In many cases our recommendations for redesign have been the clues to product improvement. The comprehensive nature of our studies is apparent from the form shown above.

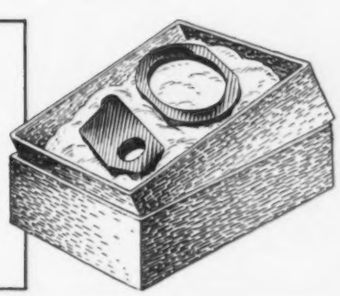
Let our metallurgists, designers and idea-men prepare this thorough analysis for you. Simply send the actual problem parts and prints to us. We will do the rest . . . with no obligation on your part.

JMLco S-FF1

FIND OUT WHERE SINTEEL POWDER METALLURGY FITS IN YOUR PICTURE

SEND 1 prints of the parts you'd like to have us analyze

2 and the actual parts themselves.



AMERICAN ELECTRO METAL CORP.

POWDER METALLURGY FOR MASS PRECISION SINTEEL

Offices in Chicago, Dayton and Detroit

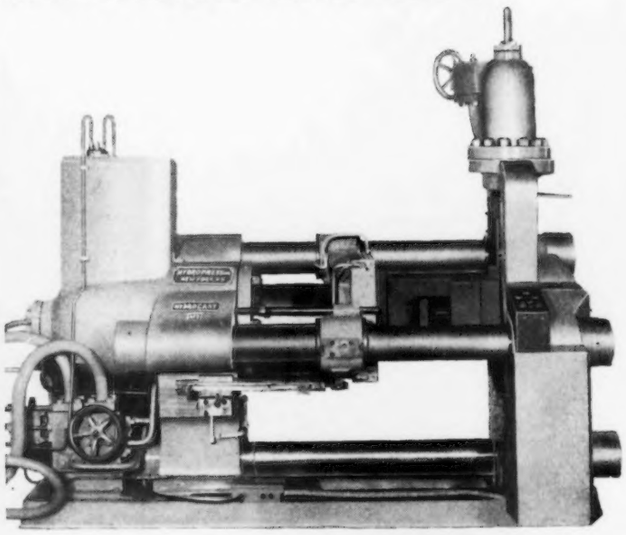
YONKERS 2, NEW YORK

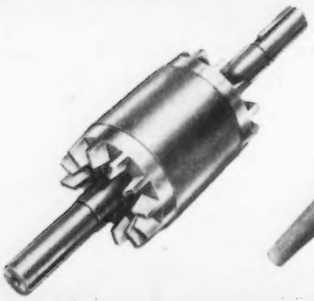
HYDROCAST (TRADE-MARK)

COLD CHAMBER DIE CASTING MACHINES

A LINE OF SIX SIZES DESIGNED TO CAST THE ALLOYS OF COPPER, ALUMINUM, MAGNESIUM AND ZINC

FULL-HYDRAULIC
SELF-CONTAINED
SEMI-AUTOMATIC
ELECTRICALLY
CONTROLLED





LET US KNOW
YOUR INDIVIDUAL
DIE CASTING PROBLEM
WE WILL WORK IT OUT
IN ACCORDANCE WITH
YOUR SPECIAL
REQUIREMENTS
ASK FOR OUR
LITERATURE L-24

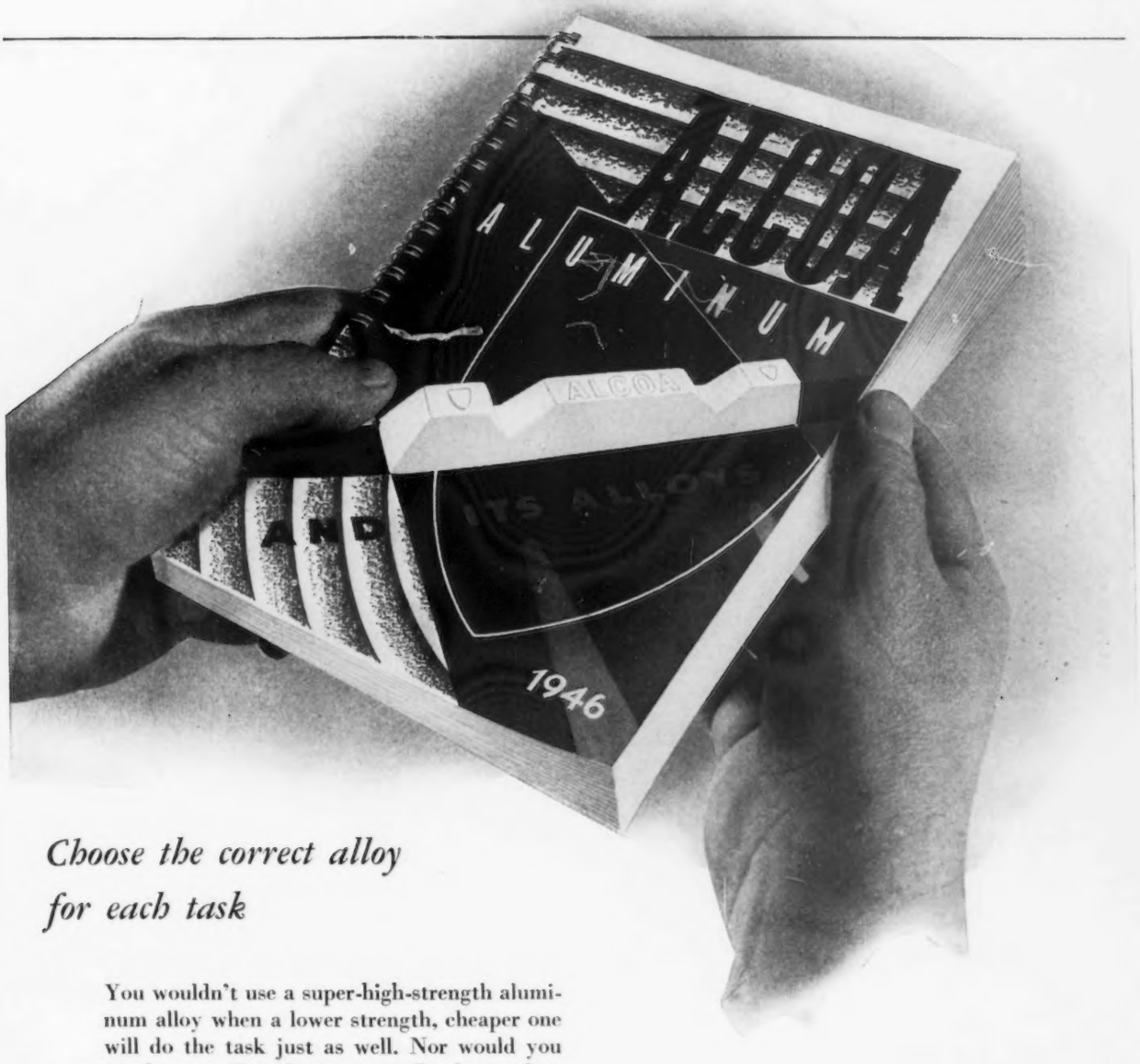
HYDROPRESS · INC.

ENGINEERS *CONTRACTORS*

HYDRAULIC PRESSES · ROLLING MILLS · PUMPS
ACCUMULATORS · DIE CASTING MACHINES

574 LEXINGTON AVENUE G.E. BUILDING *NEW YORK 22 · N. Y.*

Alcoa Aluminum IS A LOT OF *Alloys*



Choose the correct alloy for each task

You wouldn't use a super-high-strength aluminum alloy when a lower strength, cheaper one will do the task just as well. Nor would you employ an alloy that's especially designed to withstand outdoor exposure when all it's asked to do is "look pretty" at some inside location. And so on—

You spend less money when you're correctly advised on the selection of materials. Which is where Alcoa engineers fit into the picture. Calling on their years of experience in developing, testing and fabricating aluminum alloys, they are usually able to say, "That's the alloy to use." You get into production without delay.

To help you select aluminum for the usual jobs, Alcoa offers the book, "Alcoa Aluminum and its Alloys." For a free copy, write:

ALUMINUM COMPANY OF AMERICA, 2185 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

There may be a rolling mill table... an ingot car, or a skip hoist in this room

Section of Hyatt Engineering Laboratory. At right—one of many test fixtures. Hyatt bearing being given an endurance test.

EACH DIFFERENT TYPE of application makes its own special demands of Hyatt Roller Bearings—with such destructive forces as speed, impact, radial or thrust loads, and others—as well as contending with conditions of moisture, heat, cold, dust, dirt.

It is traditional to build Hyatts with endurance to outlast the equipment for which they are designed.

Our way of making sure of their capacity to do so is to simulate the conditions of the job—whether it's that of a mill table, an ingot car, or a mill motor—in our 24-hour-a-day testing laboratory.

Here, dozens of individual tests go on all the time—even to running bearings to destruction to prove their correctness of design.

Any bearing, in any stage of production may be picked for these tests by Hyatt's roving test engineers. This random selection is added assurance to the Hyatt Roller Bearing user that both workmanship and metallurgical standards are adhered to throughout the entire manufacturing process.

Hyatt engineers gladly consult with you on the selection of the proper Hyatt Roller Bearings for your product. Hyatt Bearings Division, General Motors Corporation, Harrison, N.J.

HYATT ROLLER BEARINGS

-No other material can equal ALLOY STEELS

For Putting Power to Work

If any one material has been responsible for the tremendous increases in power and speed of automotive and other mechanical equipment during the past decade, it is Alloy Steel.

The high strength-to-weight ratio of these fine steels permits transmission of hundreds of horsepower through tough, strong gears, shafts and universal joints free from excessive weight or area of cross-section.

The uniform response to hardening of alloy steels provides hard wearing surfaces at bearing areas. And high resistance to shock, reversal of stresses, severe strains and temperature extremes mean safe, dependable pins, bolts, bearings and other vital operating parts.

Alloy steels have made it possible for designers and engineers to build more powerful trucks, steam shovels and other powered equipment. And alloy steels help keep this equipment on the job, too, by giving long, trouble-free service.

Would you like to know what alloy steels can do for you? Republic—world's leader in this field of steelmaking—is fully qualified and ready to tell you. Write to

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES: CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

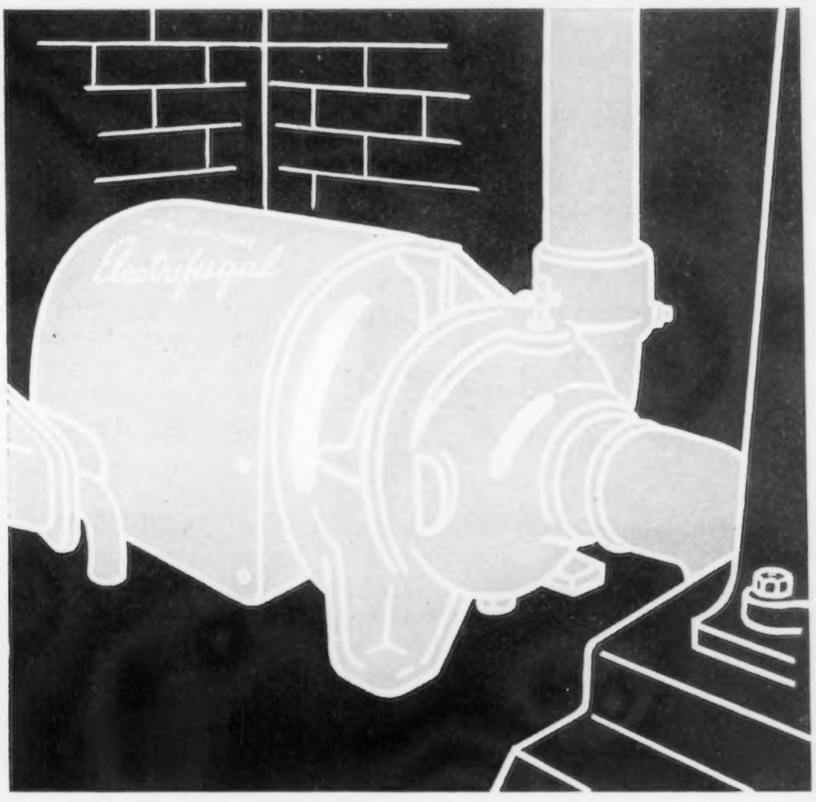
Republic
ALLOY STEELS

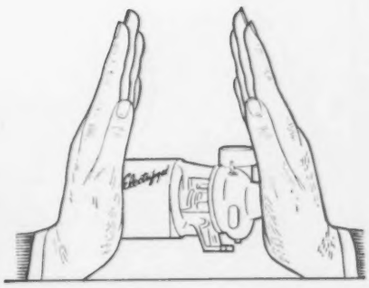
Other Republic Products include Carbon and Stainless Steels—Sheets, Strip, Plates, Pipe, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing

Economical "Package" Pump Saves SPACE and MONEY

By combining pump and motor into one compact unit, Allis-Chalmers engineers created the "Electrifugal" pump — that requires *one-third less space.* But . . . more than that . . . it costs you *less to buy — less to install — less to operate* — and has a wide range of applications.

The "Electrifugal" pump is a popular member of the complete Allis-Chalmers line of centrifugal pumps and motors: single or double suction — multi-stage — capacities to 170,000 gpm.





MORE QUICKLY INSTALLED

Comes completely assembled. Just bolt down four supports, make pipe and power connections — and start pumping! Operates in any position.

MORE QUICKLY SERVICED

Easy to get at rotor, impeller, packing and all moving parts. Take it apart and put it together fast. Down time reduced to a minimum.

YOU SAVE ON MAINTENANCE

Ample bronze wearing rings — seal cage and valve—shaft sleeve and deflector — five packing rings — precision workmanship and other quality features add up to longer life, less maintenance cost.

UNDIVIDED RESPONSIBILITY

Allis-Chalmers builds both pumps and motors — backs them up with unsurpassed experience and reputation in both fields. Call your A-C office or dealer for help on any pumping problem . . . or write for bulletin No. B6018. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

TIGHT SQUEEZE! — But this "Electrifugal" pump was built for close quarters. Allis-Chalmers engineers have developed and perfected the close-coupled pump through 20 years of experience. Built in stock sizes from ¾ to 25 h.p.

A 2037

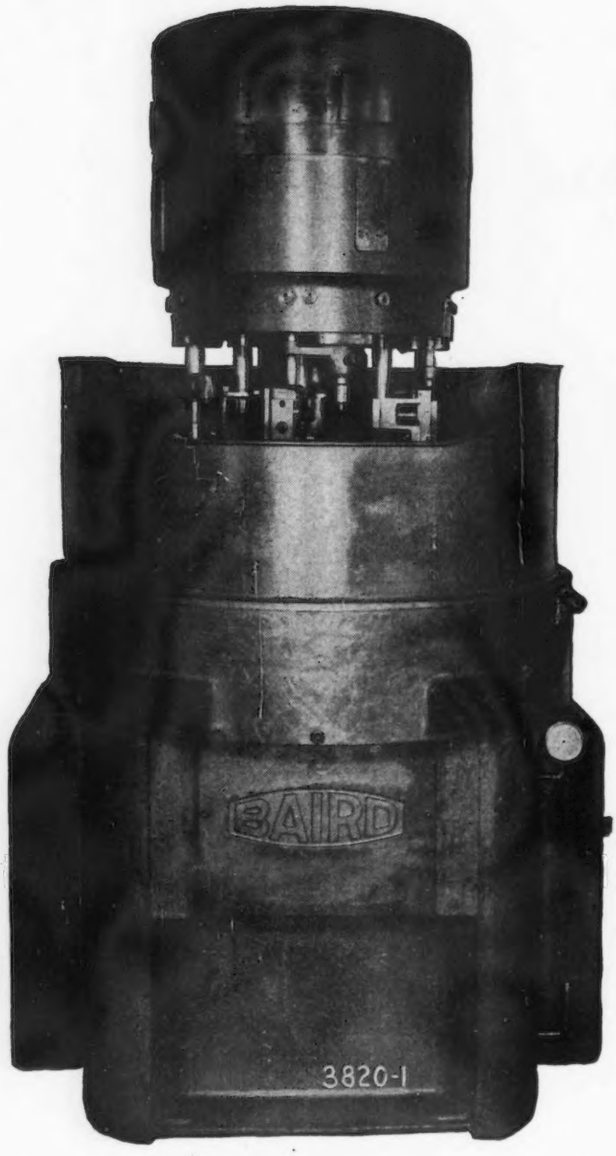
ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment-Biggest of All in Range of Industrial Products

Electrifugal **PUMPS**

HIGH PRODUCTION MACHINES

No. 54 V C AUTOMATIC CONTINUOUS VERTICAL LATHE



"ASK BAIRD ABOUT IT"

Has four 5¾" chucks on a spindle circle of 18".

Spindles with precision taper roller bearings. Speeds 172 to 1102 as may be required.

Cross tool stroke 2¾".

Feeds .001" to .030" per revolution.

Pressure lubrication.

Independent wet cutting arrangement when needed.

Spindle drive 3 to 5 h.p. with push button control.

Machine drive 1 h.p. with push button control.

Electrical equipment inclosed but easily accessible.

Foot and knee room makes for operator comfort and easier feeding.

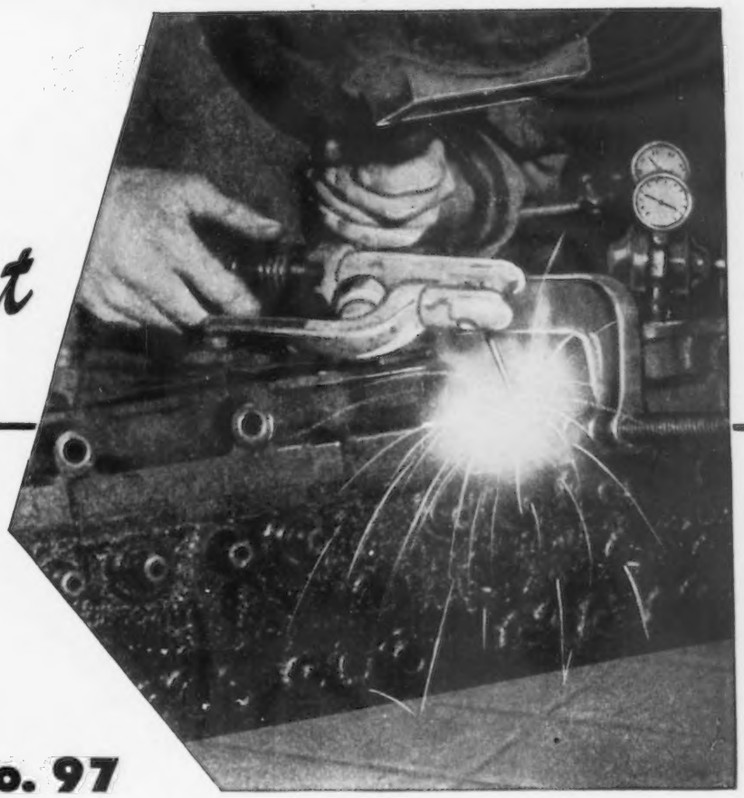
Spindle carrier cycle time 12 to 38 seconds.

Production time 3 to 9 seconds per piece.

Cutting time 7.5 to 23.7 seconds.

THE BAIRD MACHINE CO.
STRATFORD 9, CONN.

Your best bet



for cast iron welding jobs

...WILSON ELECTRODE No. 97

Here's a rod that's especially designed for all-position welding of cast iron—where machineability of the deposit is not important. Made with a core wire of mild steel with an extruded coating, the Wilson No. 97 offers these notable features:

- A pink coating that acts as a flux ... controls the arcing characteristics, permitting the use of low currents so desirable in cast iron welding.
- Smooth, uniform deposits of higher tensile strength than the cast iron.
- Light slag that is easily removed.

No. 97 is available in three popular sizes: 3/32", 1/8" and 5 32" diameters, 12", 14" and 14" lengths respectively. It is recommended for welding of cylinder blocks and heads, bearing blocks, machine parts, large frames and similar pieces. For best results, use reverse polarity with D. C. Alternating Current may also be used.

For full information about No. 97, and Wilson's complete line of electrodes, fill in the coupon and mail it today for a copy of Catalog ADW-75. Or, if you prefer, write your nearest Wilson distributor.

WILSON WELDER and METALS CO., INC.

General Offices: 60 East 42nd Street, New York 17, N. Y.

Distributed by: A. M. CASTLE & COMPANY: Chicago, Seattle, Los Angeles, San Francisco; W. P. & R. S. MARS COMPANY: Duluth; KNIGHT & WALL COMPANY: Tampa; ARCOS CORPORATION: Philadelphia; THE CONGDON & CARPENTER COMPANY: Providence; J. M. TULL METAL & SUPPLY CO., INC.: Atlanta; H. BOKER & CO., INC.: New York, Cambridge, Mass.; GRAYBAR ELECTRIC CO., INC.: Pittsburgh, Cleveland, Cincinnati.

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WILSON WELDER & METALS CO., INC.

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Please send me a copy of Wilson Electrode Catalog ADW-75.

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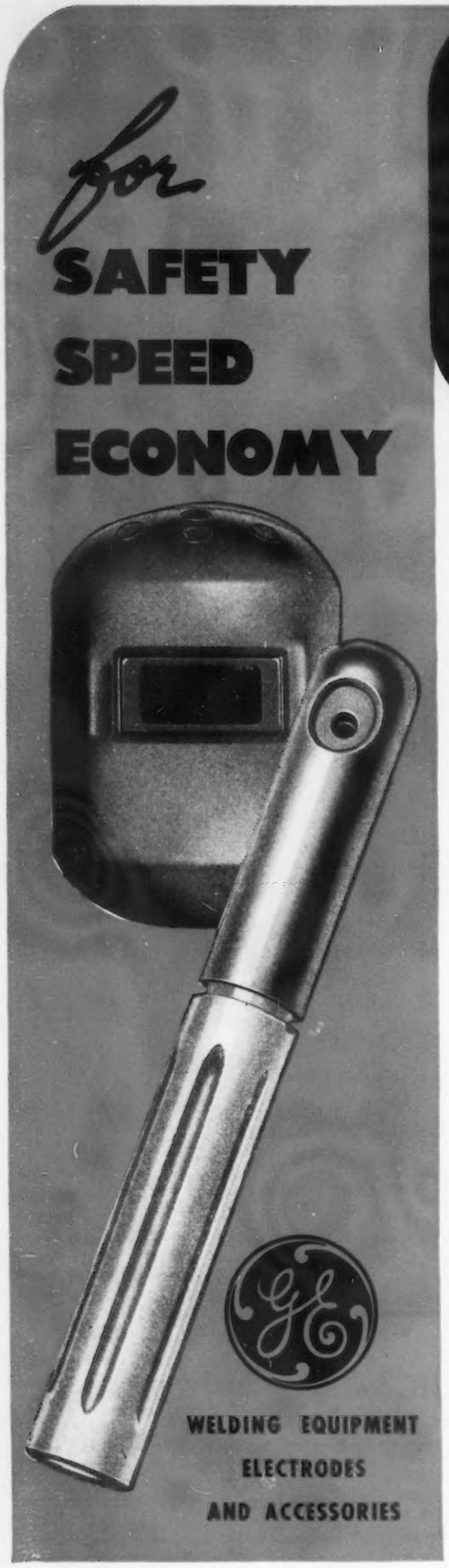


Use these G-E WELDING ACCESSORIES Tested and Proved In Many Plants

VENTILATED HELMETS

These helmets afford an extra margin of protection by incorporating an extended skull guard to protect the head and neck from falling objects, such as electrode stubs. Complete with free-floating hinged headgear and adjustable chin rests. Cat. No. 87X578. Many other popular types also available.

LENSES AND COVER GLASSES

Welder's treated cover glass, a product of G-E research, outlasts untreated glass as much as 15 to 1. The tough, transparent, moisture-proof coating maintains clear vision and resists injury and deterioration. Cat. No. 98X349.

ELECTRODE HOLDERS

Completely insulated, this light-weight electrode holder is encased in a sheath of aluminum armor for safer, cleaner, cooler operation. Cat. No. 279X17. Also available are the complete line of Jackson, Duro, and Eureka holders, and electric carbon torch.

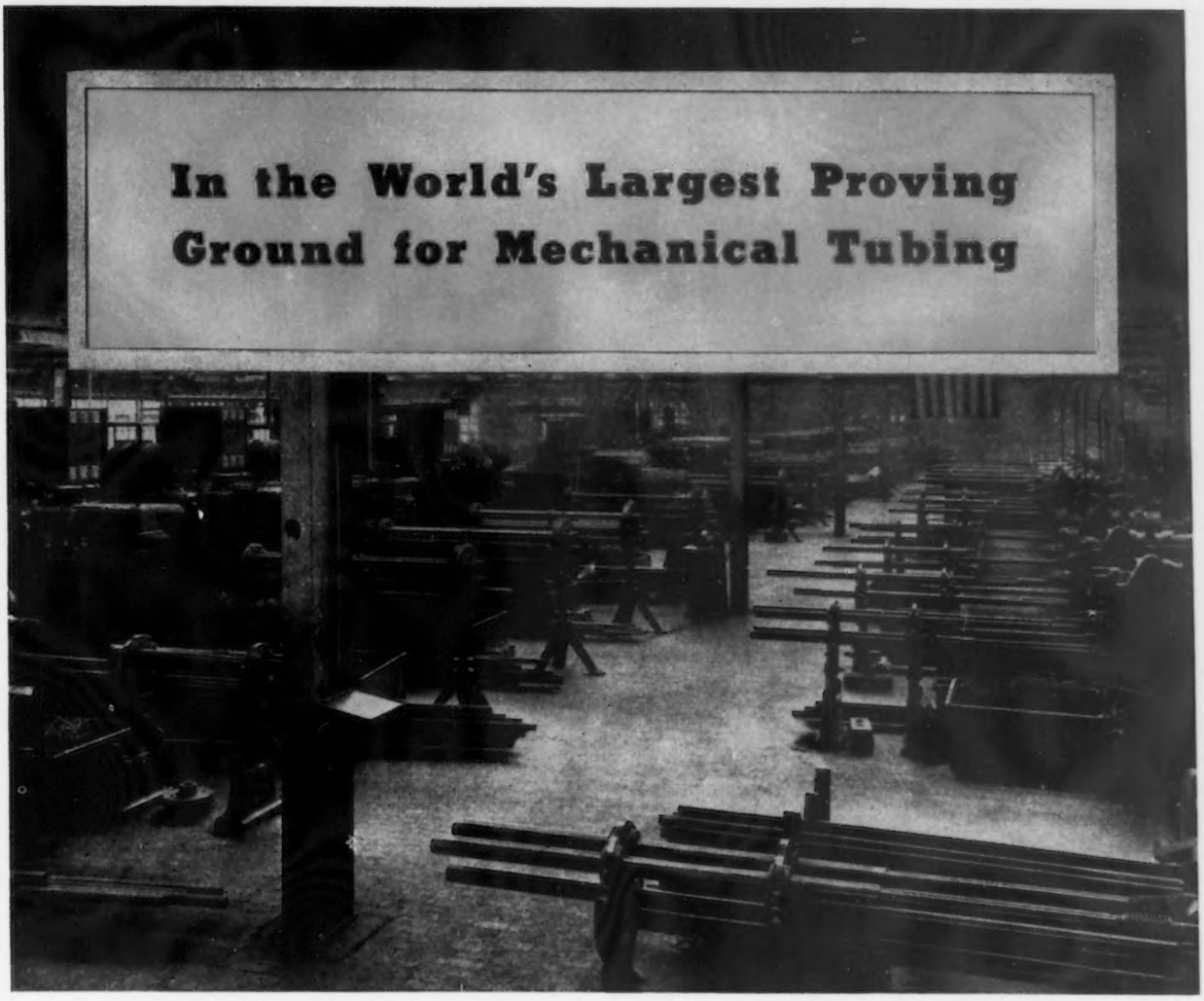
WELD-SPATTER-RESISTANT COMPOUNDS

In addition to the popular G-E 1294 (Glyptal), these new water-mixed powder-type compounds have recently been developed. They speed operations by preventing the adherence of weld-spatter to the work and can easily be removed with a damp cloth. They cannot burn nor smoke. No fumes, no oxidation. Thoroughly tested. Cat. No. 9951-9952.

The complete G-E line of accessories includes welding gloves and mittens, chrome-leather protective clothing, flame-proofed curtains, cable connectors, work and ground clamps, Strike-easy compound, weld gages, brushes and chippers, etc. Obtainable at your G-E Welding Distributor—or write for catalog GEA-2704E. General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

672-67-6748



. . . we learned to tailor the tube to the job.
Pictured above is only part of the 600 screw machines in the huge plants of The Timken Roller Bearing Company.

Here, every year, millions of feet of Timken Alloy Steel Seamless Tubing with a wide variety of wall thicknesses is machined to form cones and cups for Timken Roller Bearings in sizes from 1¼ inch O.D. to 10 inch O.D.

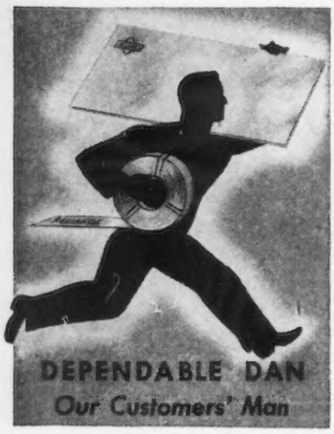
From this great proving ground and from 30 years experience in supplying alloy steel seamless tubes to major users has developed unequalled experience in producing and selecting mechanical tubing exactly suited in grade, size and finish to meet your exacting requirements in the most economical manner.

Alloy steel seamless tubes very likely will improve your product or lower your cost. Our technical staff is eminently qualified to show you how. Let us send you a copy of our booklet "Timken Seamless Steel Tubes, Finishes and Sizes." Write Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
Fine Alloy
STEEL AND
SEAMLESS TUBES

★ YEARS AHEAD — THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS in hot rolled and cold finished Alloy Steel Bars for forging and machining applications, as well as a complete range of Stainless, Graphitic and Standard Tool Steel analyses. Also Alloy and Stainless Steel Seamless Tubing for mechanical and pressure tube applications.

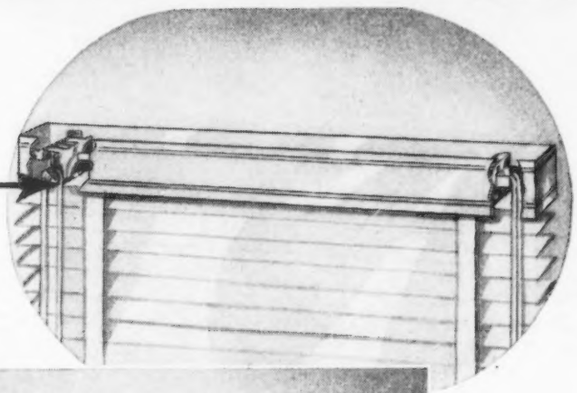


RELIANCE

JOB-FITTED STEEL

The Invisible Mark of Quality in Your Product . . .

FROM *Blinds* TO *Broilers*



. . . JOB-FITTED TO YOUR PRODUCT

When Reliance Job-Fitted Steel goes into your product, it gives up its own identity but in doing so, it imparts strength, beauty, serviceability and endurance. It makes for speedy, smooth production at low cost.

RELIANCE STEEL DIVISION

Detroit Steel Corporation

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PLANTS: CHICAGO*, CLEVELAND*, DETROIT*, LYNDHURST, N. J., WORCESTER, MASS.
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RELIANCE STEEL CORP. OF CANADA, WINDSOR, TORONTO

ALUMINUM SHEETS and STRIPS—available through locations marked*

NOW COMPLETE FINGER-TIP CONTROL FROM PENDANT STATION...

Hypro·electronic

PLANER MILLER DRIVE

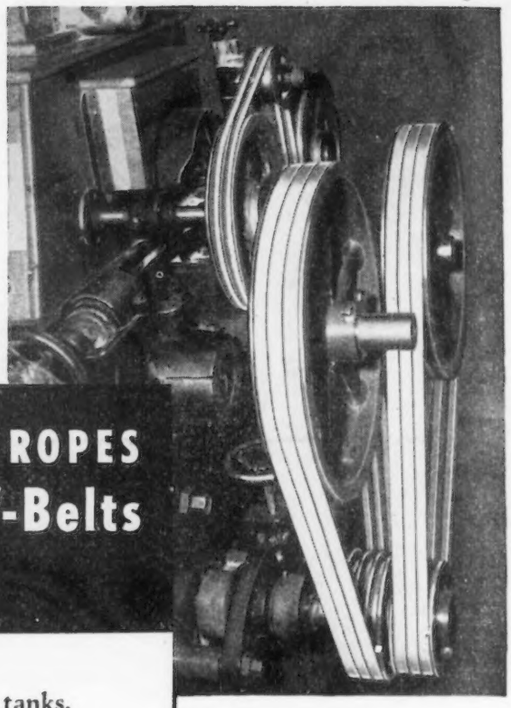
Photo on left shows operator milling the words Hypro Miller in cast-iron block — an unusual demonstration of the versatility and absolute control of any head or table from pendant station exclusively.

THE CINCINNATI HYPRO PLANER COMPANY

PLANERS · BORING MILLS · PLANER TYPE MILLERS

CINCINNATI, OHIO

Here's an important fact



GATES *Standard* VULCO ROPES are TODAY *Outwearing* any V-Belts Ever Built Before!

The simple fact that during the war our Army's tanks, tractors and self-propelled big guns required V-belts of a strength and durability never thought possible before is bringing substantial benefits to Gates V-belt users today. That is because Gates developed these greatly superior V-belts for our combat units—and here is why this fact is now important to YOU:--

with this simple reason behind it

Every improvement developed by Gates for U. S. Combat Units— and many later improvements, also—have been added, day by day, to the quality of the Standard Gates Vulco Ropes which have been delivered to you.

As a result, *long before the war was over,* you were getting in your Standard Gates Vulco Ropes a product built to far higher service standards than any V-belts ever built by anyone before the war.

And the improvement by no means ended there. Through continuing *specialized* research, the service qualities of these superior Gates Vulco Ropes have been still further improved as all of Gates facilities and energies have been returned to the service of industry.

These are the simple reasons why the standard Gates Vulco Ropes you are getting today are delivering far better service than any V-belts ever built before!

THE GATES RUBBER COMPANY
DENVER, Colorado
World's Largest Makers of V-Belts

All Gates V-Belts are Built With *The Patented* CONCAVE SIDE

Gates
THE MARK OF SPECIALIZED RESEARCH

466

GATES VULCO ROPE DRIVES

Engineering Offices and Jobber Stocks **IN ALL INDUSTRIAL CENTERS** of the U. S. and 71 Foreign Countries

LANDIS CHASERS Can Be Used For Both RIGHT and LEFT Hand Threading

12 Features of the LANDIS TANGENTIAL CHASER

1–Permanent throat permits close to shoulder threading throughout life of chasers
2–Rake angle range covers all machinable materials
3–Free cutting condition permits maximum cutting speeds
4–Simple grinding operation renews entire cutting edge and leading feature
5–Line contact with work lessens friction and minimizes thread distortion
6–Leading feature insures thread of accurate lead
7–Lateral absorption of cutting strain reduces vibration and chaser breakage
8–Right and lefthand threading feature reduces chaser equipment
9–Standard chasers thread all diameters with proper chaser holders
10–Interchangeability of chasers lowers operating cost
11–Chaser length provides exceptionally long life and low tool cost
12–Permanent throat gives equal distribution of cut

With Landis Tangential Chasers, Tool Inventories and Installation Costs Are Materially Reduced Since . . .

The same chasers may be employed for both right and left hand work merely by grinding the proper cutting angles at both ends of the chasers. For cutting left hand threads, use left hand chaser holders and reverse the action of the spring as illustrated above.

The Finest Thread Cutting Tool in Industry

LANDIS MACHINE COMPANY

WAYNESBORO, PA., U.S.A.

THREADING MACHINERY—THREAD CUTTING DIE HEADS—COLLAPSIBLE TAPS

SEAMLESS and WELDRAWN* — *Stainless Steels • Alloy Steels Carbon Steels • Nickel & Inconel Monel • Beryllium Copper*

Superior tubing *must* have what it takes, judging from the demands of the manufacturers of quality peacetime products. Many of these same manufacturers were engaged in production for the armed forces, where quality took on a new meaning—lives, many lives depended on it.

Quality can't be "just skin deep"—it must pervade the innermost parts of a product. Tubing usually loses its identity in end use—it very often is just a "line on a blueprint"—but a line or part that must perform as well as the costliest component in the assembly.

Choosing the proper analysis depends upon combinations of such properties as corrosion resistance, formability, machinability, high strength at high temperature and surface finish. Superior maintains tireless control of these factors as well as physical dimensions and tolerances, all of which contribute to tubing quality. Our ability to predict accurately the results to be experienced with any given analysis, is your assurance of enduring, faultless performance in production and end use.

Superior engineers and metallurgists are ready to help you choose the exact analysis for your product. Design with Superior tubing and be sure!

*Registered U. S. Trademark

THE BIGGER NAME IN SMALL TUBING Superior

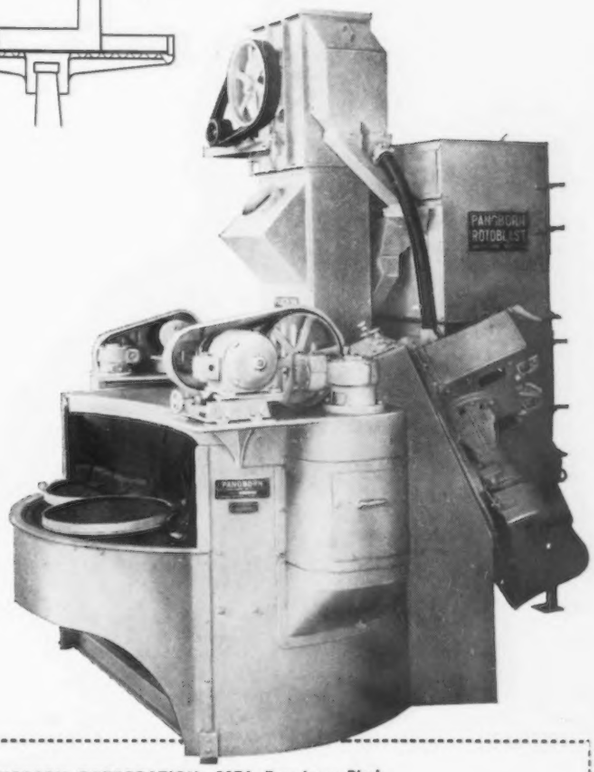
SUPERIOR TUBE COMPANY
Norristown, Pennsylvania

BLAST CLEANING BOTH VERTICAL AND HORIZONTAL SURFACES *at One Time*

No other airless blast machine has this cost-saving feature

Thorough and uniform cleaning of vertical and horizontal surfaces with one pass through the machine—eliminating the necessity, in many cases, of turning the work for second and third passes . . . has revolutionized the blast cleaning of large or small castings and other metal parts on table-type machines.

Pangborn's ROTOBLAST* Table directs the blast stream onto the work at a 45° angle. Thus a great variety of shapes can be handled on this table with complete assurance that all planes will receive equal cleaning—no possibility of over-cleaning some planes.



And These Other PANGBORN FEATURES Save You More Time and Money

Variable table speed. Can be suited to the work—higher speeds (and higher production) for pieces easy to clean.
Large work openings. High work pieces easily handled.
Rim drive. Driving the table from the rim (instead of from center spindle) gives smoother motion and facilitates inspection of driving unit.
No clogging. The abrasive sweeps are rotated independently of the table; regardless of amount of abrasive thrown, the sweeps handle it without clogging.
Surface peening. Uniform abrasive impact over every point of the work table (due to 45° wheel) and variable table speed make this unit ideal for surface peening as well as blast cleaning.

Send coupon now for Bulletin 211A on ROTOBLAST Tables. And for any type of blast cleaning equipment—airless or compressed air—"Come to Pangborn", *world's largest manufacturer of blast cleaning and dust control equipment.*

*Trademark of the Pangborn Corporation

Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

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Check also for information on: ROTOBLAST Rocker Barrels ☐
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ROLLING

with new efficiency!

Magnesium takes off the load

Running through the many applications of magnesium today there is a basic story. It is vividly told again in this lightweight, roller-type conveyor . . . magnesium saving time and costs . . . increasing efficiency . . . giving a new lift to industry.

By utilizing magnesium . . . tubing for rollers . . . extruded bulb channel sections for side members . . . hexagonal magnesium rods for shafts . . . and other applications, the Jervis B. Webb Company cut the weight of this conveyor from 160 to 68 pounds. It became light enough for one man to handle, instead of two. Because of this efficiency . . . achieved through magnesium . . . Railway Express Agency, whose rail and air express service is nationwide, installed these lightweight conveyors in many terminals throughout the country.

For full information on what magnesium can do to make better products, contact your nearest Dow office.

Ready . . . to make products move!

MAGNESIUM

LIGHTEST OF ALL STRUCTURAL METALS

Dow magnesium, produced from sea water by a unique chemical method, is available to American industry in all common forms.

For 30 years Dow engineers have led the way in magnesium research and the development of new applications and products.

Products like this home griddle are included in the growing list of consumer and industrial magnesium applications.

MAGNESIUM DIVISION • THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

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